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THESIS

Implications For The Military Health Care System in Utilizing Non-Physician Providers: Part I -- The Cost Implications

by

Brian Richard Colfack

March 1979

Thesis Advisor: D. R. Whipple

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Implications For The Military Health Care System in Utilizing Non-Physician Providers: Part I -- The Cost Implications		5. TYPE OF REPORT & PERIOD COVERED Master's Thesis; March 1979
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Brian Richard Colfack		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Naval Postgraduate School Monterey, California 93940		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Naval Postgraduate School Monterey, California 93940		12. REPORT DATE March 1979
		13. NUMBER OF PAGES 189
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Physicians Assistant
Non-Physician Provider
Health Care Costs

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Since the development of the physician's assistant and nurse practitioner concepts within the civilian health care system during the mid-1960's, each of the military medical departments comprising the Military Health Care System has added a force of these non-physician providers to their inventory of health care personnel.

This study attempts to present a historical perspective of the factors leading to the development of these concepts, within both the civilian and military health care sectors. Once this background

DD FORM 1473 1 JAN 73 (Page 1) EDITION OF 1 NOV 65 IS OBSOLETE S/N 0102-014-6601 |

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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The study identifies four major cost elements; salary, overhead, raining, and supervision. These and other factors are reviewed nd analyzed as to their implications for the Military Health are System.

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Implications For The Military Health Care System in Utilizing Non-Physician Providers: Part I -- The Cost Implications

by

Brian Richard Colfack
Lieutenant, Medical Service Corps, United States Navy
B.S., The George Washington University, 1977

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

from the

NAVAL POSTGRADUATE SCHOOL
March 1979

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ABSTRACT

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ACKNOWLEDGEMENTS

Sincere gratitude is extended to Dr. David Whipple for his frequent and helpful advice in the development of this study.

Particular appreciation is also due Rear Admiral Robert L. Baker, Medical Corps, United States Navy, who freely shared his extensive knowledge and experience.

Finally, a special gratitude is owed to all those individuals, military and civilian, who contributed the data which made this study possible.

I. INTRODUCTION

The Physician's Assistant (PA) and Nurse Practitioner (NP) Concepts were spawned and developed within civilian health-care settings during the decade of the 1960's. The concepts were related to the independent-duty military corpsman concept which, until the arrival of the PA and NP, had no similar counterpart in civilian health-care settings. Enough years have passed, and enough articles have been published since the 1960's, that the PA and NP concepts are no longer new to the medical community. However, the implementation of these concepts within the Military Health Care System (also referred to as the Military Health Services System) /Ref. 1, p. 3/ did not occur until this decade (1970's).

A. PROBLEM STATEMENT

Given that the civilian health-care community has had almost a decade more experience than the Military Health Care System (MHCS) with these concepts; given that the preponderance of the literature concerning these concepts is directed toward non-military health-care settings; and given the author's experience in, and knowledge of, the MHCS; what are the implications for the MHCS in utilizing these non-physician providers (PAs and NPs)?

B. APPROACH TO THE STUDY

In pursuing this study, over 700 separate articles and

studies from the civilian literature, in addition to numerous other documents and data listings provided by the military services, have been collected, read, and indexed. In assimilating this data the author has attempted to pose the question, " What are the main components of each major element identified, and what are their attendant implications for the Military Health Care System?". Another question kept in mind while reviewing this data was, "Does this particular element appear to be an opportunity or constraint in relationship to the Military Health Care System?".

The major area of concern in this study, which was assumed "a priori" by the author, is the cost implications associated with the utilization of these non-physician providers. While this study is intended to "stand alone" with respect to its content, it is envisioned as the first of two related studies dealing with the implications for the Military Health Care System in the utilization of non-physician providers.[1]

Since each study has a primary area of interest and analysis, additional elements, while significant, are relegated to a less-intense analysis.

---

[1] The second study addresses staffing and utilization implications. Part Two is currently being prepared by Lieutenant Bobby G. Clark, MSC, USN at the Naval Postgraduate School, Monterey, California. It should be noted that the research efforts in preparing for both of these studies have been a collective effort between Lieutenant Clark and myself.

C. DEFINITIONS AND LIMITATIONS OF THE STUDY

Listed below are definitions of key terms which will be used repeatedly throughout this study. Except where noted, they are direct quotations from the current literature and appear to have wide general acceptance within the medical community. Limitations as to the author's usage of the terms are noted, where appropriate.

1. Physician's Assistant (Type A)

"A Type A person is able to perform a range of tasks, such as collecting historical and physical data and is also capable of integrating and interpreting these findings. This PA is potentially capable of functioning beyond the immediate surveillance of the physician". [Ref. 2, p. 439]

2. Physician's Assistant (Type B)

"The Type B assistant does not have a general knowledge but rather possesses great skill in one clinical specialty or certain specialty procedures". [Ref. 2, p. 439]

3. Physician's Assistant (Type C)

"The Type C assistant can perform a wide variety of tasks, but under supervision, as he or she is not capable of integrating and interpreting findings". [Ref. 2, p. 439]

For the purpose of this study, the term "physician's assistant" will be limited to personnel who meet the definitional requirements of the Type A PA. In addition, for the purpose of this study the following categories of health personnel are also considered as Type A PAs: Physician's Associate; Child Health Associate; Community Health Medic; and MEDEX.

4. Nurse Practitioner

"In contrast to the physician's assistant, the nurse practitioner is an independent health care professional who practices nursing under her own license and is legally accountable to the consumer. She perceives her role as consulting with the physicians rather than functioning under their supervision. Within the scope of her preparation and competence, she makes decisions about levels of wellness and illness, identifying patient problems, and assuming responsibility for their management and outcome. She is concerned with comprehensive health care, including prevention of illness, promotion of wellness, and rehabilitation". [Ref. 3, p. 4-5]

For the purpose of this study the term "nurse practitioner" is considered to be inclusive of: nurse clinicians; nurse associates; nurse midwives; and all specialty nurse practitioners.

5. Non-Physician Providers

This is the author's term for non-physician health care personnel serving in primary-care extended roles, characterized by the performance of certain medical functions previously held within the realm of the physician. While this definition could apply to numerous categories of health care personnel, for the purpose of this study it will be limited to physician's assistants and nurse practitioners.

6. Military Health Care System

This term is synonomous with the Military Health Services System and--"is comprised of the military resources

of the Army, Navy, and Air Force, organized to provide the health services necessary to support and maintain all military forces in fulfilling their approved missions, to create and maintain high morale in the Uniformed Services by providing a comprehensive, high-quality, and uniform program of health services for members and eligible beneficiaries". /Ref. 1, p. 3/

D. ORGANIZATION OF THE STUDY

Following the introductory chapter, Chapter II presents a historical perspective of the development of the physician's assistant and nurse practitioner concepts in America. The historical perspective is approached from both the civilian and military viewpoints. Data depicting the current composition of the Military Health Care System, by provider-type and by military service, is presented in Chapter III. The cost implications of utilizing non-physician providers are explored and analyzed in Chapter IV. Chapter V is the summary and conclusions to this study.

II. HISTORICAL PERSPECTIVE

A. CIVILIAN

1. Physician's Assistants

Excluding the independent-duty military corpsman who was already performing certain medical tasks with limited or no physician supervision, the concept of the physician's assistant in America began in the early 1960's. In his doctoral dissertation concerning PAs, Hubbard /Ref. 4, p. 45-46/ found that the first article embracing this concept appeared in the June 10, 1961 issue of The Journal of the American Medical Association. The author, Charles L. Hudson, M.D., was a member of the American Medical Association's (AMA's) Council on Medical Services and he proposed that two new types of health workers be developed: the first, would be an advanced technician who could not be expected to exercise medical judgment, but might develop considerable technical skill; the second, termed an "externe", would be an advanced medical assistant who could handle technical procedures as well as assuming some degree of medical responsibility. /Ref. 5, p. 839-841/

Dr. Hudson's article generated little positive action towards implementing this concept, and it was not until 1964 that the concept again surfaced when the American Association of Opthalmology surveyed their membership to obtain direction for the use and training of assistants in ophthalmology. /Ref. 6, p. 47-48/

However, between the time that Dr. Hudson's article first appeared (1961) and the American Association of Opthalmology survey occurred (1964), the idea of developing a new type of medical personnel to assist in delivering medical care was developing elsewhere. [Ref. 7, p. 34] In 1962 the Chairman of the Department of Medicine at Duke University, Dr. Eugene Stead, Jr., began an unsuccessful postgraduate education program for physicians. The program failed due to a lack of participants which was determined to result from area physicians lacking the time needed to participate in continuing education programs. [Ref. 8, p. 40]

That local physicians were overworked and health manpower shortages existed became even more evident when it was determined that in rural areas around Duke University the physician-population ratio was only one-third that of the national average, and within Duke University Medical Center itself, there were severe nursing shortages due to a high turnover rate. [Ref. 9, p. 34-35] In fact, the nursing shortage was so acute that local firemen were trained and used as substitutes. Dr. Stead envisioned that the solution to this problem would be to train male health-care providers, for males would as a group tend to be more career-minded. [Ref. 8, p. 42]

Thus, growing out of this health manpower shortage the first university-trained physician's assistant program was born in 1965 at Duke University. Dr. Stead reasoned that this new class of health-care manpower would be preferred to

existing allied health manpower for several reasons: first, PAs would complement, not replace, other health-care manpower; secondly, this new concept would attract new personnel so as to supplement existing manpower; thirdly, a new career ladder would develop to attract and retain competent personnel who were currently leaving the medical area for higher-paid careers in non-medical industry; and lastly, he envisioned that the PA, by eliminating some repetitions tasks from the physician which did not require his high level of training and capability, would make the physician's career more rewarding and interesting. /Ref. 10, p. 21-22/

Other factors impacting on the decision to implement the PA concept at Duke were: increasing specialization by physicians with a resultant shortage of primary-care physicians; geographical maldistribution of physicians with concentrations in wealthy metropolitan areas while rural areas experienced shortages; and an inability to produce enough new physicians over the next five to ten years to meet demand, so the PA was viewed as a method by which existing physician manpower could increase its productivity. /Ref. 7, p. 35-36/

From its inception, the PA program at Duke was geared toward attracting the ex-military corpsman and others with previous medical experience. It was believed that this type of student would produce a high degree of career stability. /Ref. 11, p. 26/ Dr. E. Harvey Estes, Jr., who in 1967 acquired administrative responsibility for the Duke PA program /Ref. 7, p. 35/, later wrote that "men from backgrounds

as military corpsmen" became the "substrate" of the program. /Ref. 12, p. 46/ Duke's first PA class consisted of three students, all ex-military corpsmen. This trend continued through the second class of five students, and the third class of 12 students. But by 1974 when class size had stabilized at 40 students, an increasing number came from civilian backgrounds. By 1974 Duke's PA program was receiving about 1,000 applications for its 40 positions. /Ref. 12, p. 48/

Also in 1965, the first Ophthalmic Assistant training program in America was being established at Georgetown University. The program was designed to produce an assistant that would team with, and work under the direct supervision of, a licensed opthalmologist. /Ref. 4, p. 49-50/

In 1967 two more PA programs were developed: the Opthalmic Assistant Program conducted both at Baylor University and at the University of Texas; and the Medical Specialty Assistant Program in Coronary Care at the Grady Memorial Hospital at Atlanta, Georgia. /Ref. 4, p. 54/

September 1968 saw the development of the first four-year baccalaureate PA program, a program directed at high school graduates, at Alderson-Broaddus College, Phillippi, West Virginia. /Ref. 7, p. 37-38/

By 1969 the PA concept was growing and gaining acceptance, as attested to by the development of these additional programs: The Child Health Associate Program, Denver, Colorado; The Clinical Corpsman Program, Cleveland, Ohio; MEDEX, Seattle,

Washington; The Physician's Associate, Wake Forest, North Carolina; The Clinical Associate Program, University of Kentucky; the Surgical Assistant, Birmingham, Alabama; and the Medical Specialty Assistant Program, Atlanta, Georgia. [Ref. 4, p. 63]

Of these new programs, the MEDEX Program deserves further mention. The Duke University PA program, with its two-year length almost evenly divided between didactic and practicum training, has served as one major model for other programs. The MEDEX Program has been a second basic model. The first MEDEX program was established at the University of Washington under the direction of Dr. Richard Smith. This original program, as well as subsequent MEDEX programs in other areas, emphasized attracting ex-military corpsmen and generally required about three months of didactic non-degree training followed by nine months of preceptorship training by a physician. [Ref. 13, p. 24-25]

At that point in time, political and social factors further influenced the historical development of the PA concept. One of these factors was the growing perception of "health care as a right". [Ref. 8, p. 40] Kacen [Ref. 7, p. 40] has stated, "the enactment of the Medicare and Medicaid bills in 1965 were tangible expressions of the health care as a right principle". After the passage of these bills, even the AMA, which had previously opposed such a principle, reversed its position and in 1969 accepted the basic principle. [Ref. 7, p. 40-41] Whatever the reasoning behind Medicare and

Medicaid, the result of their enactment was a huge jump in the rate of increase in overall health-care prices which reflected an increased demand for medical services and manpower.

Another factor impacting on the growth of the PA concept was the Vietnam War. With thousands of veterans returning each year, the Federal Government assumed a role in assisting their transition to civilian occupations. The previously mentioned MEDEX Program was but one federally-financed effort in directing former military corpsmen back into health occupations. MEDIHIC (Military Experience Directed Into Health Careers) was another, and Project Transition and the President's Jobs For Veterans program had similar implications. /Ref. 7, p. 39/

In 1971 President Nixon asked Congress for more federal support for training for non-physician providers: "one of the most promising ways to expand the supply of medical care and to reduce its cost is through a greater use of allied health personnel, especially those who work as physician's and dentist's assistants, nurse practitioners, and nurse midwives". /Ref. 14, p. 2/

All these factors, especially the increased federal funding, gave rise to tremendous growth in the number of PA training programs. Sadler /Ref. 15, p. 846/ found that the number of programs training PAs and nurse practitioners jumped from 12 in 1970 to 111 in only three years.

With the increase in PA training programs also came the development of organizations to represent the PAs. The

first, the American Academy of Physician's Assistants was founded by a group of graduates from the Duke University program in April 1968. Originally formed as the American Association of Physician's Assistants, it later changed its name to the American Association of Physician's Associates, and then to its current title. /Ref. 13, p. 28/ Its purpose was to limit educational diversification of paramedical personnel, establish moral and ethical guidelines, and promote continuity in the quality of care furnished by its members. The organization has an official publication entitled P.A. Journal. /Ref. 13, p. 28/

The next PA organization was formed in September 1971, and is the American Association of Physician's Assistants. Its goals were to develop guidelines for national PA certification, provide an employment source to employers of PAs, and to promote interest in the PA as a career. Its official publication is the AAPA Newsletter. /Ref. 13, p. 28/

A national organization was also formed to represent the educational programs of the PA--The Association of Physician's Assistants Programs. It brought together a collection of various types of training programs to exchange ideas, research, and curricular material. It publishes the Association of Physician's Assistants Programs Newsletter. /Ref. 13, p. 28-29/

As the PA concept grew, accreditation of the PA programs came into being. Led by the AMA, in collaboration with the American Academy of Physician's Assistants and numerous

medical specialty societies, approved programs were adopted by the AMA House of Delegates as follows: December 1969--orthopedic PAs; December 1971--primary care PAs; June 1972--urologic PAs, and later surgeon's assistants. /Ref. 16. p. 3/ The orthopedic PA accreditation was withdrawn by the AMA in 1976 (as supported by the American Academy of Orthopedic Surgeons) due to a lack of demand for these graduates. The AMA's authority as the accrediting agency for PA programs has been recognized by the U.S. Commission of Education, Office of Education, Department of Health, Education, and Welfare (HEW). /Ref. 16, p. 4/

The next step in the growth of the PA concept was the formulation of a national credentialing mechanism. The AMA was again instrumental in this process, and in 1972 the National Board of Medical Examiners (NBME) formed a National Commission on Certification for Physician's Assistants (NCCPA). /Ref. 13. p. 41/ The NCCPA is headed by representatives of 14 national health organizations, including the AMA, the American Academy of Physician's Assistants, the American Nurses Association (ANA), the American Academy of Family Physicians, and the American College of Surgeons. The NBME has developed and administers the exam in the fall of each year, while the NCCPA determines who is eligible to take the exam, determines the exam pass/fail scores, and certifies the successful participants. /Ref. 16. p. 4/

The first national examination was administered in December 1973, and was available only to primary-care PAs.

In addition, only graduates from over 60 AMA accredited or government-supported PA programs were eligible to participate. /Ref. 13, p. 41/ Andrews /Ref. 17, p. 21/ later reported that only 880 of 1,600 eligible PAs participated in the exam. The NCCPA requires that recertification occurs every two years through continuing medical education, and every six years by reexamination. /Ref. 16, p. 4/

The growth in the PA concept appears to have peaked and stabilized, as evidenced by the fact that from August 1974 to October 1977 eight accredited PA programs terminated any further student input and quietly went out of business. /Ref. 18/ Today, there remain 49 accredited PA programs in the U.S., in addition to two accredited surgeon's assistants programs. /Ref. 18/ As of 1979, the American Academy of PAs has a membership of 11,200 PAs, of which 3,000 are PA students. /Ref. 19/

2. Nurse Practitioners

Much of the impetus for the development of the nurse practitioner concept in America parallels that of the physician's assistant concept: NPs would help to correct physician maldistribution by providing services in underserved areas; they would become a source of needed primary-care manpower; and they would reduce health care costs by being less expensive to train and utilize than physicians. /Ref. 20, p. 255/ However, there have been, and still remain, some major differences in the forces and interactions which developed and shaped the NP concept.

While it appears that the PA concept received more acclaim and publicity than that of the NP concept, the NP concept actually predates that of the PA. The first variant of the NP, termed a "nurse clinician" was envisioned by Frances Reiter as a nurse who would be distinguished by a high degree of discriminative judgment and clinical knowledge, would be directly involved in the observation of the patient, and would develop a collegial relationship with physicians and other health care representatives. [Ref. 21. p. 135] [Ref. 22, p. 72] Depending on the literary source, Ms. Reiter is credited with coining the phrase "nurse clinician" as early as 1943 [Ref. 21, p. 135] and as late as the early 1950's. [Ref. 22, p. 72]

Wahtever the date, the literature is silent regarding attempts to implement this concept until 1963 when Siegel and Bryson [Ref. 23, p. 1015-1024] reported that there had been public health nurses in northern California since 1962 functioning in expanded roles in child health care. Also beginning in 1962 was the use of Nurses at Massachusetts General Hospital to manage the long-term care of chronically-ill patients. [Ref. 24, p. 1477] In 1963, due to an acute shortage of nurses and low levels of patient care, the New York City Department of Hospitals created some positions for nurse clinicians and defined roles to meet specific needs. [Ref. 22, p. 74]

The first formal NP training program began in 1965, the same year that saw the birth of the Duke University PA

program. This first program was established at the University of Colorado by Dr. Henry Silver, and was a four-month program to train pediatric nurse practitioners. The course contained a moderate amount of didactic teaching and a large amount of practical training in various clinical settings. Dr. Silver envisioned that graduates of this program would be capable of a high degree of decision-making, could practice with considerable independence, and would have the skill, ability, and competence to care for almost three-fourths of all children seen in various ambulatory settings. /Ref. 25, p. 55-56/

As with the PA concept, once the first training program had been implemented, numerous other programs developed rapidly. This rapid expansion of NP programs was encouraged and financially assisted by the federal government. Both The Nurse Training Act of 1964 (PL 88-581) and Title II of the Health Manpower Act of 1968 (PL 90-490) provided assistance in establishing nurse practitioner training programs by providing special project grants. Additionally, those nursing schools which established extended-role training programs were provided financial incentives to do so through federal capitation funds. /Ref. 26, p. 179/ These two pieces of legislation straddled the Medicare and Medicaid legislation of 1965, which was previously discussed in relation to the PA concept, and gave rise to increased demands and inflationary pressures on the entire health care system. Thus, the NP was envisioned as being one measure to help reduce increasing health care costs and, in the words of one

author for the National League of Nursing (NLN), "to substantially extend the delivery of health care services in rural and other underserved areas". /Ref. 27, p. 5/

However, unlike the PA concept which, despite rapid growth, was controlled extensively by the AMA, the NP concept fought to retain control over its own destiny. Kane and Wilson /Ref. 20, p. 256/ have given an excellent summary of the situation when they wrote, "Medicine views the PA as an extension of the physician--a para-professional who can fulfill many of the tasks usually carried out by the doctor. In contrast, nursing sees the NP as a means of extending the profession into more direct responsibility for primary patient care, but with a definite orientation towards maintaining a clear identification with the traditional values of nursing".

Thus, we see that the NP, unlike the PA, has not been content to have her role delegated to her by the physician, but has strived to retain an identity as a profession separate and distinct from medicine. /Ref. 20, p. 256/ This is evidenced by the fact that in late 1969 the AMA approached nursing with an offer to play an extended role as a physician's assistant. The offer was so strongly repulsed that the AMA then concentrated its efforts on the non-nurse physician's assistant. /Ref. 28, p. 35/ However, nursing and medicine soon came into conflict again in February of 1970 when the then AMA Executive Director, Dr. Ernest Howard, publically announced an AMA scheme to convert 100,000 nurses to physician's assistants. Unfortunately, the AMA acted unilaterally

without consulting either of the two national nursing organizations or even the third-party health insurers who would be expected to pay for the services rendered by the new "physician's assistants". /Ref. 28, p. 50/

The American Nursing Association (ANA) reacted swiftly and vehemently in deploring this action on the basis that it was not the AMA's perogative to speak for any other profession, nor should the AMA attempt to solve its own shortage of physicians by exacerbating the shortage of nurses. /Ref. 28, p. 50/ The other national nursing organization, The National League of Nurses (NLN) also deplored the AMA decision as neither the ANA or NLN had been consulted, the NLN believed one profession should not be depleted to meet the needs of another, and finally the NLN believed that problems such as these could be solved only through cooperation and collaboration between nursing and medicine. /Ref. 28, p. 50/

In March of 1970 an AMA-ANA-NLN ad hoc committee was formed to encourage and establish future communication channels. While other nursing and medicine conflicts arose later, an overall concept of teamwork has been generally emphasized with bilateral actions between nursing and medicine.

However, nursing has maintained the distinction that nurse practitioners are not physician's assistants, and the 1971 ANA Board of Directors statement that, "the term physician's assistant should not be applied to any of the nurse practitioners being prepared to function in an extension of the nursing role", is still valid today. /Ref. 29, p. 1/

In an unofficial ANA handout developed in 1973 and revised in 1976, nurses considering becoming physician's assistants are cautioned, "The career promotion and career development of the PA is dependent entirely on the good will of the physicians. It is doubtful that the physicians, in the long run, will enthusiastically promote this concept". [Ref. 29, p. 3]

This same handout also states that the distinction between nursing and medical practice, "is the different emphasis of practice, the nurses' emphasis on the psychosocial needs of patients rather than just the pathological; its emphasis on preserving wellness rather than just curing sickness; its emphasis on the whole patient, his family, his community, rather than just an isolated organ; its emphasis on coordinating total health care rather than giving just isolated bits of care". [Ref. 29, p. 3] This distinction agrees with that of another nurse-author who states, "the clinical nurse specialist, the nurse clinician, or the clinical nurse is not a physician extender". [Ref. 22., p. 80]

Yet, this view disagrees with the one expressed in the 1975 Comptroller General's report to the Congress which lumps PAs and NPs into one "physician extender" category. [Ref. 14] This terminology was later assailed by a writer for the NLN who stated, "A professional nurse is a practitioner of nursing. The professional nurse is not a physician's extender". [Ref. 27, p. 8]

As has been shown, although medicine and nursing have mellowed their earlier positions and attitudes, the conflict

over roles and responsibilities has remained. Evidence of this conflict is found in a December 1977 report on the changing status of the relationships between medicine and nursing filed by the AMA House of Delegates which reports that, "the desire of many nurses to assume functions that traditionally have been accepted as part of the practice of medicine, and the incorporation of these acts into the extended role of the nurse have created role conflict between the physician and the nurse. /Ref. 3, p. 1/

One of the elements adding to this role conflict stems from confusion over who actually is a "nurse practitioner" due to the varying lengths of training involved and the numerous different types of NP training programs currently in existence. In 1973 one nurse-educator surveyed 56 master's degree programs in clinical nursing, ranging from 9 to 24 months in length, and concluded that there is, "no standardized product that can be labeled a clinical nurse specialist". /Ref. 21. p. 138/ This same problem was cited in the aforementioned AMA report which stated, "the definition, the level of preparation, and the legal role of the "nurse practitioner" are unresolved issues today". /Ref. 3, p. 3/

The AMA report found that the two main sources of training for NPs are short-term courses and master's level programs. The short-term courses, which lead to a certificate, range from 3 to 14 months of training and are the primary source of expanded role NPs. A 1976 survey of 86 of these certificate programs found that 88.4 percent required

less than a baccalaureate degree for admission. Many nurse educators believed that these programs would only be temporary until replaced by baccalaureate and master's programs, and even the American Association of Colleges of Nursing foresaw their demise by 1980. However, they appear to have a great deal of current "survivability" due to continued federal funding. [Ref. 3, p. 3][Ref. 26, p. 1799]

The master's level NP has a high level of clinical practice with preparation for research and leadership. She is prepared to function at a policymaking level and is given knowledge of health care organization and planning functions. At this level she is often referred to as a "clinical nurse specialist". [Ref. 3, p. 3]

The baccalaureate level NP program has not yet been forthcoming. Current baccalaureate programs do not prepare nurses for the level of responsibility for decision-making required of the nurse practitioner. [Ref. 3, p. 3]

A 1974 survey of NP programs found a total of 133 programs in the U.S. Of 131 of the programs responding, 86 were certificate programs and 45 were master's programs. The survey estimated that in 1974 there wer 8,500 nurse practitioners and midwives employed at that time, but this total included some registered nurses who acquired their "nurse practitioner" status through on-the-job training from physicians. [Ref. 26, p. 1801]

In 1976 the AMA found 130 certificate programs and 45 master's programs graduating NPs. As of December 1976

they estimated that there were 10,000 to 12,000 formally, but variously trained NPs in the country. [Ref. 3, p. 3] This estimate is in agreement with an earlier projection which forecasted "over 12,000" NPs in 1977. [Ref. 26, p. 1801] The source of this estimate also cited the total number of NP training programs to be over 250. [Ref. 26, p. 1801]

The NP concept continues to grow today. In a 1977 directory of NP programs, prepared jointly by HEW and the State University of New York at Buffalo, a total of 130 certificate programs and 45 master's programs were listed. All of these programs met the following cirteria: students must be registered nurses (RNs) to enroll; the program must have a formal curriculum; the NP curriculum is a program requirement, not an elective; the program must provide preparation in extended nursing roles; and the program must have started its first class of students as of September 1977. [Ref. 30] The 130 certificate programs and 45 master's programs spanned 42 of the 50 states, plus the District of Columbia and Puerto Rico.

As of August 1977, 39 states had amended their nurse practice acts to expand the scope of permissible nursing functions, while Virginia chose to amend its medical practice act so that medical functions could be delegated under the regulation of the Board of Medicine. Of the remaining 10 states which have statutory prohibitions against nurses treating and diagnosing patients, several are drafting legislation to change this provision. [Ref. 3, p. 5]

The growth of the NP concept may be a reflection of the general changes in our society. As one physician-author has stated, "It is seldom recognized...how closely developments in nursing paralleled those of women's status in general." /Ref. 31. p. 86/

B. MILITARY

1. Physician's Assistants

Physician's assistant programs in the military were founded by the Army, Navy, and Air Force in the early 1970's in response to declining numbers of primary-care physicians and the prospect of even further reductions due to the impending end of the "doctor draft". /Ref. 16. p. 9/ The "doctor draft" had provided the military with its major source of primary-care physicians and, as in the civilian community, the PA was viewed as a means of augmenting the dwindling physician resources. /Ref. 13/ One author believes that the civilian PA programs may have influenced the military to begin their own since a large proportion of the first civilian PA students came from the ranks of the military's corpsmen population. /Ref. 32/ With the end of the "doctor draft" in June of 1973 the Department of Defense (DoD) was predicting a 13 percent physician shortage by fiscal year (FY) 1976 with an accompanying increase in the overall beneficiary population. /Ref. 1, p. 3/ These predictions undoubtedly encouraged the PA concept within the military.

a. Air Force PAs

The U. S. Air Force was the first military service to implement a PA training program. It began on October 12, 1970 with a directive for its establishment by the Air Force Surgeon General. /Ref. 32, p. 25/ The first class of 25 students began their training in July of 1971. /Ref. 13, p. 26/

The original program was envisioned as two-phased, with Phase I to consist of nine months didactic training and Phase II to be a twelve month clinical preceptorship in selected Air Force hospitals. However, in June of 1972 the didactic Phase I was extended to twelve months so as to comprise a full two-year program. /Ref. 32, p. 25/

The original training began, and is still given, at the School of Health Care Sciences at Sheppard Air Force Base, Texas. The program is affiliated with the University of Nebraska and, like its civilian counterparts, is accredited by the AMA. Students earn 90 semester-hours credit for completion of both phases, and if they have previously earned or later earn an additional 30 semester-hours of credit they are awarded a Bachelor of Science degree by the University of Nebraska. /Ref. 32, p. 25, 30/ Until late 1978, all Air Force graduates of this program remained enlisted men but were given accelerated promotion to the top three enlisted grades (E-7, E-8, E-9). The Air Force PAs were provided additional compensation in the form of monthly "professional pay" payments. One author found that the combination of

accelerated promotion and professional pay kept them more than competitive with their Army and Navy counterparts. /Ref. 13/

Beginning in the fall of 1978, the Air Force instituted a policy of granting full officer commissions to those PAs who had completed the requirements for their baccalaureate degrees. Depending on their educational and experience levels the commissions ranged from Second Lieutenant (O-1) through Captain (O-3). No current data is available regarding the numbers promoted to each grade. The Air Force has no Warrant Officer community, and no provision for granting this type of commission. Temporarily suspended by Congress, the commissioning program is now continuing. It is the author's understanding that those PAs not completing the degree requirements for commissioning within four years will lose their PA status within the Air Force. Theoretically, a commissioned Air Force PA may rise in rank to the grade of Colonel (O-6). /Ref. 33/

The current projected end-strength of 283 Air Force RAs /Ref. 32, p. 7/ has been reached as of 1979. Only two Air Force PAs remain in the training phases; however, information provided by the staff at Sheppard Air Force Base indicates that the current Air Force Surgeon General is studying the adequacy of the current end-strength figure. The training program at Sheppard Air Force Base has not closed and is currently providing training to some members of the Army National Guard.

Air Force PAs are utilized in the general therapy or family practice settings within various Air Force hospitals. /Ref. 32, p. 12/ With the advent of the Air Force commissioning process, it is expected that the Air Force will move toward recruitment of future PAs from graduates of civilian programs and may eventually discontinue thier current training program. No data is available as to the success of their current civilian PA recruitment efforts.

b. Navy PAs

The Navy initiated their PA program in 1971. However, instead of developing a formal training program similar to that of the Air Force, the Navy began their program as a pilot project. The first 12 students, selected from the Navy's Hospital Corps ranks, would undergo a three-year on-the-job training syllabus at various Naval hospitals. In 1972 the Navy changed the program to one modeled after the civilian "university model" previously described, which consisted of one year of formal didactic training and one year of clinical practicum at selected Naval hospitals. To this end, in 1972 the Navy sent 15 students to The George Washington University for the didactic training phase. The PA program at The George Washington University was an AMA accredited program and granted 90 semester credit hours towards a Bachelor of Science degree which required a total of 120 semester credit hours. /Ref. 32, p. 30-31/

Additionally, in 1972 the Navy sent 10 students to the Air Force PA program at Sheppard Air Force Base.

Based on data from this joint-service training venture the Navy and Air Force training programs were merged in the fall of 1973. The Navy was alloted training spaces for 102 students per year under the new arrangement. /Ref. 32, p. 31/

After the consolidation of Navy and Air Force PA training no further students were sent to The George Washington University program. However, prior to the consolidation the Navy sent another class of 15 students plus the eight remaining original PA students who had completed two years of on-the-job training to The George Washington program for the didactic phase. Despite the consolidation, they were allowed to complete their training at George Washington. /Ref. 32, p. 31/

Upon completion of their Phase II training, Navy PAs were appointed to the grade of Warrant Officer (WO-1). Their career path allows for advancement to the grade of Chief Warrant Officer (CWO-4). The Navy has since disestablished the grade of Warrant Officer (WO-1) for the entire Warrant Officer community, and any future Navy PA candidates would be appointed to Chief Warrant Officer (CWO-2).

The Navy originally envisioned having a total PA force of 355. Their current force, as will be discussed in the next chapter, is substantially below the 355 figure. Although the current force is below the total originally envisioned, the Navy has had no new input into PA training for some time due to" budget limitations". However, in December of 1978 the Chief of Naval Operations announced that the

Secretary of the Navy was reinstituting PA training during 1979. /Ref. 34/

Under this new program applicants are being solicited from hospital corpsmen in pay grades E-5 through E-9. Two training sites are being established: the first, at the Naval Regional Medical Center (NRMC), Portsmouth, Virginia, will convene in April of 1979 with an estimated class of 20 students; the second site, at NRMC, San Diego, California, is planned to begin in September of 1979 with a class of 25 students. (Further implementing instructions for the program are contained in Secretary of the Navy (SECNAV) Instruction 1421.6.)

That the two sites chosen for the Navy's new PA program happen to coincide with the Navy's current sites for their Advanced Hospital Corpsman (Designator 8425-Independent Duty) training is not coincidental. Appendix A contains a proposal by The George Washington University, initiated by the Navy's Health Sciences Education and Training Command, Bethesda, Maryland, to modify the existing curriculum for independent duty corpsmen so as to align it with the proposed PA training syllabus. Implicit in this proposal is the idea that independent duty corpsmen thus trained will provide an ideal pool of personnel for future selections of PA candidates. If selected for PA training, these candidates would bring with them a high level of primary-care skills to which little additional didactic training would be added during their PA training phase.

The concept is innovative and heretofore unparalleled in military PA training. It diverges from the "Duke University training model" previously adopted by all the military PA training programs and assumes the basic "MEDEX model" which was previously discussed. This concept has prima facie appeal as containing incentives for reducing overall training costs within the Navy Medical Department.

Preliminary data as to the exact length of the didactic and clinical practicum phases of the new PA program is currently unavailable, although the total program length is estimated to be of one year's duration. Appendix A indicates that the program will be structured so as to gain AMA accreditation and will be academically affiliated with The George Washington University. It is anticipated that graduates of both the independent duty curriculum and the PA training curriculum will be awarded a total of 90 semester credit hours toward the 120 semester credit hours required for the Bachelor of Science Degree in Health Science.

Concomitant with this new PA training program the Navy has also made a decision to actively recruit new PAs from the civilian sector. In a letter from the Bureau of Naval Personnel (BUPERS) dated 26 June 1978, the Commander of the Navy Recruiting Command was authorized to recruit 10 PAs from the civilian sector during FY 1979. In addition to the normal physical and U. S. citizenship requirements, applicants must be graduates of AMA accredited programs, have one year's experience as a PA (waived if the applicant had exceptional

academic performance), and be certified by the National Commission of Certification of PAs, Atlanta, Georgia. /Ref. 35/

Research for this study indicates that both of the first two applicants meeting these recruitment requirements were subsequently denied by a board convened at the Bureau of Medicine and Surgery (BUMED), Department of the Navy, Washington, D.C. This would seem to indicate that standards for acceptance into the Navy PA community are very stringent. Applicants, if accepted, will be appointed to the grade of Chief Warrant Officer (CWO-2), United States Naval Reserve.

The success of the Navy's recruitment of civilian PAs at the grade of CWO-2 relative to the Air Force's efforts to recruit them at the grade of Second Lieutenant (O-1) is unclear. It would appear that the Air Force PA recruit would gain a long-run monetary advantage over his Navy counterpart due to the difference in rank structure.

This author perceives no mass exodus of Navy or Army Warrant Officer PAs to the Air Force in order to obtain higher rank and higher pay. This perception is based first on the "bird in the hand" phenomena. Since the Air Force has no Warrant Officer community, and hence no direct method for a Warrant Officer in another service to cross over to the Air Force, a Navy or Army PA would have to be completely discharged from his parent service before entering the Air Force (a risky proposition for one who has invested a substantial number of years towards military retirement). Second, the "service loyalty and satisfaction" aspect tends to cause a

PA in the Army or Navy to feel a sense of responsibility to the service in which he has served for a number of years, a service in which he understands the inner-workings and relationships, and a service which, if providing current job satisfaction, will not be lightly traded for an unknown quantity.

To be sure, Navy PAs are aware of the increasing disparity in compensation between themselves and Air Force PAs. Recent interviews with Navy PAs at the Naval Aerospace Regional Medical Center, Pensacola, Florida revealed that the Navy versus Air Force pay disparity is viewed as an inequitable situation, especially in light of the common PA training received, to which they desire the Navy to address itself.

Navy PAs are currently utilized in primary-care settings within a broad spectrum of Naval Regional Medical Centers, Naval Hospitals, and Branch Clinics (an exact breakdown by type of facility is found in Chapter Three). Although the Navy Medical Department supports the U. S. Marine Corps and all Navy ships, the PA has yet to see extensive utilization in these areas.

c. Army PAs

The Army PAs concept was born on July 14, 1971 with the program approval by the Army Deputy Chief of Staff for Personnel. The first class was composed of 60 students who began their training on February 28, 1972 at the U. S. Army Academy of Health Sciences at Fort Sam Houston, Texas.

The original concept and training consisted of a 12 month didactic phase, followed by a 6 month clinical preceptorship at selected Army hospitals. When the second class convened in August of 1972 the preceptorship was lengthened to 12 months.

The program has been conducted in its entirety at Fort Sam Houston, with an affiliation with Baylor University. It is an AMA accredited program, and graduates are awarded an Associate of Science degree by Baylor University. /Ref. 13/

From its inception, the Army PA program has differed from that of the Air Force and Navy in that the Army PA has been extensively utilized and directed toward service in combat battalions. The Air Force and Navy, in keeping with the civilian concept of using the PA to augment and not replace the physician, have carefully avoided using "physician substitute" as a synonym for the PA. The Army, however, tends to view their PAs as replacements for the battalion General Mdeical Officers. /Ref. 32/ The utilization of over three-fourths of the Army PAs in combat units prompted Page /Ref. 32, p. 10/ to state that, "The Army intends for PAs to perform in a clinic setting only as a rotation from duty with troop units or if they happen to be colocated on the same post as an Army hospital". (Chapter Three of this study gives an extensive breakdown of the current types of assignments of Army PAs.)

The Army originally planned for a total force of 400 PAs and has since attained that goal. While the PA program at Fort Sam Houston remains accredited by the AMA, it is currently inactive.

Army PAs, like their Navy counterparts, were commissioned as Warrant Officers in the U. S. Army. They can rise in rank to the grade of Warrant Officer (W-4).

2. Nurse Practitioners

While the military PA concept has been well documented in the literature, the literature is very vague regarding the development of the military NP concept. This tends to parallel the development of the NP concept within the civilian community where the PA concept received much wider publicity and acclaim.

a. Air Force NPs

The first Air Force NPs began training in April of 1966 when the Air Force established "Advanced Obstetrics-Gynecology Courses" in selected Air Force hospitals. In 1973 the Air Force shifted the training of its OB-GYN NPs to the University of Kansas. This program was short-lived as in February of 1974 the program was moved to its current site at the Air Force School of Health Care Sciences, Sheppard Air Force Base, Texas. The OB-GYN NPs in this program receive two months of practical training followed by a six month preceptorship. Students take a written exam at the end of the practical training phase and a practical exam at the conclusion of the preceptorship phase. Upon successful completion of these requirements they are awarded an Air Force certificate as an OB-GYN nurse practitioner.

The Air Force has recruited some OB-GYN NPs from the civilian community. These NPs must take the Air Force practical exam, but there is no waiting period prior to doing

so. The training program at Sheppard Air Force Base is not affiliated with any civilian university. /Ref. 36/

Pediatric NP training in the Air Force began in 1970 with the establishment of a program at Wilfred Hall Air Force Hospital, San Antonio, Texas. In 1973 the pediatric NP training was shifted to four civilian institutions: Good Samaritan Hospital, Phoenix, Arizona; University of Rochester, New York; University of Virginia; and Methodist Hospital, Indianapolis, Indiana. These courses, as well as other NP specialty courses at civilian institutions, were sponsored by the Air Force Institute of Technology at Wright-Patterson Air Force Base, Dayton, Ohio.

In January of 1974 the pediatric NP program was relocated to the School of Health Care Sciences at Sheppard Air Force Base. In September of 1978 the program was placed in "standby" status with no further student enrollment and the Air Force shifted its emphasis to civilian recruitment of further pediatric NPs. /Ref. 36/

The Air Force began training of primary-care NPs in April of 1974 at the University of Arizona. As with other NP training, the primary-care training was then shifted to the School of Health Care Sciences at Sheppard Air Force Base in October of 1974. This program was inactivated in November of 1976.

Some input of primary-care NPs has been received through out-service master's programs sponsored by the Air Force Institute of Technology. Other primary-care NPs have

been obtained through civilian recruitment. However, as of 1978 the Air Force was neither training nor recruiting any further primary-care NPs. /Ref. 36/

In December of 1970 the Air Force had its first nurse midwife on active duty to function in that capacity (there were others on active duty but they were not functioning as such). In December of 1971 the Air Force began actively recruiting nurse midwives from the civilian community. In June of 1972 the Air Force Institute of Technology began sponsoring midwife training at the University of Mississippi and in March of 1973 added programs at Georgetown University and the University of Utah.

In early 1973 the Air Force initiated its own midwife training program at Andrews Air Force Base Hospital, Washington, D.C. This program is still active. There are currently no students in out-service midwifery training programs. Since February of 1978 the Air Force has reemphasized its civilian recruitment efforts of nurse midwives and by December 1978 had successfully recruited two. /Ref. 36/

All nurse practitioners in the Air Force, even if nationally certified, are recertified by the School of Health Care Sciences at Sheppard Air Force Base. (Data on current totals of Air Force (and Army and Navy) NPs is contained in chapter three of this study.)

b. Navy NPs

While data on the development of the NP concept within the Navy is not as comprehensive as that of the Air

Force, the data available tends to indicate that the Navy's use of NPs was motivated by a different concept than that of the Air Force and Army. While the Air Force and Army's approach to development of the NP concept was more formal, the Navy NP was born from a "grass-roots" approach.

As early as June of 1972 the Navy Medical Department discovered that numerous NP on-the-job training programs were being established on the local level within various Naval hospitals. Thus, it appears that the original impetus for NPs within the Navy came about due to their perceived need by the individual commanding officers of various Naval hospitals. Realizing this need for NPs within the Navy Medical Department, the Navy's Bureau of Medicine and Surgery took steps to formally establish NP billets within the Navy and to formalize their training. /Ref. 37/

A formal program to train pediatric NPs was then established at the then Naval Hospital (now NRMC) at Portsmouth, Virginia. Further data on this program was not available, other than the fact that it has since been disestablished. In 1974 a formal NP training program was established at the Naval Regional Medical Center, San Diego, California and the first class of students began their training in October of that year. This program is still active and provides training in several NP specialties. The program is affiliated with the University of California at San Diego and consists of a six month didactic phase followed by a six month preceptorship phase. Graduates are awarded a certificate, and are

also grandted some credits toward a master's degree. Since the beginning of this program, the Navy has also begun sending Navy nurses to formal out-service NP programs at selected civilian universities. Graduates of these out-service programs are awarded master's degrees. /Ref. 37/

The Navy is currently actively recruiting NPs and Nurse Anesthetists to fill billets which we understand were recently transferred to them on a "temporary basis" by the Navy Medical Corps. The Navy recruits, trains, and utilizes NPs in the following specialty areas: pediatrics; family practice/adult health; and OB-GYN/midwifery. /Ref. 37/ As do all the military services, the Navy grants full officer commissions to their NPs within the Nurse Corps, and they can aspire to the rank of Rear Admiral, Lower Half (O-7). The equivalent rank in the Army and Air Force is Brigadier General.

c. Army NPs

Impetus for the NP concept within the Army appears to have stemmed from the Army's Automated Military Outpatient Systems (AMOS), a project begun in 1969 at DeWitt Army Hospital, Fort Belvoir, Virginia. /Ref. 38, p. 620/ This project was instituted to develop new methods of outpatient care delivery and to apply computer technology where appropriate. From this project emerged two categories of health care personnel: one was a chronic care nurse practitioner; the other was a Type C physician's assistant called an "AMOSIST", who was used to treat actue minor illnesses "triaged" to him through the use of clinical algorithms. /Ref. 38, p. 621/

No data was available as to the training of this first Army NP, but it is assumed that she was selected on the basis of currently held skills at that time and gained additional skills from on-the-job training and the use of clinical algorithms in treating patients.

In 1971 the Army initiated a formal Army Nurse Contemporary Practice Program to design and implement nurse clinician programs in various specialty areas. The result was the modification of existing advanced specialty programs in pediatrics, OB-GYN, and psychiatry/mental helath to include primary-care skills. In addition to these NP courses, a new NP Ambulatory Care Course was developed and implemented. /Ref. 39. p.1/ All four courses place heavy emphasis on the role of the nurse as a primary health care provider in ambulatory settings.

While historical data on all but the ambulatory care course was not available, all four courses are currently in operation. The ambulatory care course began at Fort Benning, Georgia in February of 1972 and was of 18 weeks duration. In July of 1972 a similar program was opened at Fort Ord, California. It graduated one class of five students and was then closed until July of 1974. Both programs were operational from July of 1974 until December of 1975 when Fort Ord's program again closed due to an insufficient number of students. In July of 1976 the program at Fort Benning was terminated and the Fort Ord program reopened. This program is currently 22 weeks in duration and graduates two classes

of eight graduates per year. All four Army NP specialty courses are a part of the Army's Academy of Health Sciences at Fort Sam Houston, Texas. /Ref. 39, p. 1/

In the fall of 1974 all Army NP courses became affiliated with the University of Texas and students could earn up to a maximum of 16 graduate credits. This affiliation was terminated in March of 1978 and no new affiliations have been initiated. /Ref. 39, p. 1/

The Army appears to differentiate between "nurse practitioners" and "clinical nurse specialists", based on educational background. As one Army instruction notes, a nurse practitioner is defined as, "an Army Nurse Corps Officer who has a minimum of a baccalaureate degree in nursing and who has successfully completed a program of instruction leading to a certificate as a nurse practitioner". /Ref. 40, p. 2/ A clinical nurse specialist is defined as a nurse, "whose minimal professional qualifications include a master's degree in nursing and the prerequisites for award of clinical proficiency designator, 9B". /Ref. 40, p.2/

Data could not be obtained as to the Army's current civilian recruitment policy for NPs. Nowever, the Army Health Services Command's model for ambulatory care nurse clinicians provides that Army nurses with graduate level civilian preparation in a clinical nursing field and/or those who have completed self-study programs or a formal course which has enabled them to acquire requisite skills may be recognized as nurse clinicians. /Ref. 41, p. 2/

III. THE CURRENT PROVIDER MIX WITHIN THE MILITARY HEALTH CARE SYSTEM

The structure into which non-physician providers are introduced must be viewed as a system. While the Military Health Care System (MHCS) can be broken down into the medical departments within each of the military services, and each of these military medical department can be further subdivided into individual corps and cadres of health care personnel, it is important for the military decision maker to realize that changes in the numbers and types of health care personnel within one corps or cadre will have an overall systemic effect on the others. For example, the introduction or reintroduction of significant numbers of non-physician providers into the system will incur a demand on physician time in the form of supervisory activities. Additionally, non-physician providers generate workload requirements for other ancillary personnel, such as radiology, the laboratory, and the pharmacy. Office space, exam rooms, and medical supplies and equipment must be furnished. Then administrative and personnel needs must be met. In other words, to view them as a separate and isolated entity would result in sub-optimization.

Therefore, before attempting to analyze the cost implications associated with utilizing non-physician providers, this chapter will be devoted to a description of the

composition of the Military Health Care System in terms of its health care personnel.

The sources of the data to be presented in this chapter will not be referenced. This is so because the data utilized was furnished by the individual military services from their internal management information systems in such a form that referencing would be difficult and would be of little or no value to others. For example, untitled computer printouts of "raw" data at a particular moment in time are unlikely to be duplicated at a later date due to the continuous updating of the data base. The civilian employee data to be presented was provided by the Defense Manpower Data Center (DMDC), Monterey, California.

Table I provides a description of the total military health care system physician force, by rank. It is important to understand the size of this physician force, as it was pointed out in the previous chapter that the impetus for non-physician providers within the military stemmed, in large part, from declining numbers of physicians. A recently reported study has placed the MHCS's current number of authorized physician billets at 11,841, of which 9 percent are vacant. /Ref. 42, p. 1, 4/ That study cited a current MHCS physician force of 10,791, while Table I shows a total force of 10,761. The slight difference is probably attributable to differences in dates on which the data was assembled.

TABLE I

TOTAL MILITARY PHYSICIANS BY RANK (1978)

RANK	NAVY	ARMY	AIR FORCE
(Navy/Army & Air Force)			
Vice Admiral/LT General (O-9)	1	1	1
Rear Admiral/Major General (O-8)	5	7	4
Rear Admiral/Brig General (O-7)	8	8	11
Captain/Colonel (O-6)	387	425	359
Commander/LT Colonel (O-5)	434	674	642
LT Commander/Major (O-4)	1,273	1,489	1,126
Lieutenant/Captain (O-3)	1,336	1,578	1,007
GRAND TOTAL	3,444[a]	4,167[b]	3,150[c]

a = as of August 1978
b = as of September 1978
c = as of 30 July 1978

Tables II, III, and IV are respective breakdowns of the current Navy, Army, and Air Force physician forces by specialty and subspecialty. Only the Navy data allowed a breakdown of physicians into Board Certified (BC) and Fully Trained (FT) categories, while both the Navy and Air Force data can be differentiated as to practicing physicians and those still in training. The Army data was furnished in such a manner as to allow only totals by specialty/subspecialty.

Table V is a composite display of each service's physician force by specialty (only internal medicine subspecialties are shown) and relative percentage of total physician force by specialty. This table has significance to the decision-maker who is contemplating using, or who is currently utilizing, non-physician providers. The significance lies primarily within the aggregate numbers of physicians found within the family practice, internal medicine (not including subspecialties), and primary care fields, for it is this aggregate group of physicians which the non-physician providers are primarily intended to augment. While some NPs are intended to augment other specialty areas such as pediatrics, obstetrics/gynecology, and psychiatry (in the Army), the largest percentage of military non-physician providers have been directed towards this primary care aggregate.

In the Navy, this aggregate comprises 31.28 percent of the total physician force, while it is 51.01 percent in the Army, and 43.25 percent in the Air Force. Assuming roughly equal demands for primary care services as a percentage of

TABLE II

TOTAL NAVY PHYSICIANS BY SPECIALTY
(August 1978)

SPECILATY	BC/FT/TR[a]	TOTAL
Anesthesiology	025/076/044	145
Critical Care Medicine	000/001/000	1
Dermatology	030/015/022	67
Emergency Medicine	000/002/002	4
Executive Medicine	(N/A)	105
(Includes CO's, DCS's, BUMED, & Fleet Staffs)		
Family Practice	055/103/072	230
Internal Medicine	033/122/066	221
Internal Medicine Subspecialties:		
Allergy/Immunology	000/001/001	2
Cardiology	008/018/010	36
Endocrinology/Metabolism	006/008/005	19
Gastroenterology	012/013/007	32
Hematology	005/018/010	33
Infectious Diseases	001/004/005	10
Nephrology	002/005/003	10
Oncology	001/000/000	1
Pulmonary Medicine	007/013/007	27
Rheumatology	003/005/000	8
Tropical Medicine	001/002/000	3
Interns	000/000/247	247
Medical Research Officers	(N/A)	38
Neurology	006/016/010	32
Nuclear Medicine	002/003/004	9
Obstetrics/Gynecology	036/088/054	178
Obstetrics/Gynecology Subspecialties:		
Maternal/Fetal	000/003/001	4
Oncology	001/004/005	10
Perinatal	000/001/000	1
Ophthalmology	024/033/025	82

TABLE II continued

SPECIALTY	BC/FT/TR	TOTAL
Opthalmology Subspecialties:		
Cornea Surgery	000/000/001	1
Retinal Surgery	001/000/003	4
Otolargngology	027/030/030	87
Pathology, Anatomical/Clinical	039/020/034	93
Pathology, Anatomical	005/010/009	24
Pathology, Clinical	005/001/002	8
Pathology, Forensic	002/000/000	2
Pediatrics	069/109/039	217
Pediatrics, Subspecialties:		
Allergy	002/001/000	3
Cardiology	002/005/000	7
Neonatalogy	004/005/002	11
Nephrology	002/002/002	6
Orthopedics	001/000/001	2
Surgery	000/003/000	3
Physiology, Hyperbaric	000/005/002	7
Physical Medicine, Rehabilitation	000/004/001	5
Preventive Medicine, Aerospace	028/008/006	42
Preventive Medicine, General	003/002/002	7
Preventive Medicine, Occupational	008/004/003	15
Preventive Medicine, Public Health	007/003/002	12
Primary Care	000/637/000	637
(Includes Flight Surgeons & Submarine Medicine)		
Psychiatry	024/071/029	124
Psychiatry, Child	000/004/001	5
Radiology, Biological	000/001/000	1
Radiology, Diagnostic	026/054/041	121
Radiology, Therapy	001/002/003	6
Surgery Specialties:		
Colon/Rectal	003/000/000	3
General	047/079/047	173
Hand	000/004/002	6

TABLE II continued

SPECIALTY	BC/FT/TR	TOTAL
Neurological	007/015/011	33
Oncology	000/003/001	4
Orthopedics	026/068/047	141
Plastic	004/009/003	16
Peripheral/Vascular	000/005/001	6
Thoracic/Cardiovascular	011/016/003	30
Urology	015/027/025	67
TOTAL		3,492[b]

a: BC = Board Certified
FT = Fully Trained, but not BC
TR = In Training

b: includes 8 MD's, unidentified by specialty

TABLE III

TOTAL ARMY PHYSICIANS BY SPECIALTY
(September 1978)

SPECIALTY	TOTAL
Executive Medicine	48
Nuclear Medicine	11
Preventive Medicine	53
Occupational Medicine	3
General Medical Officers	1,403
Pulmonary Disease	18
Gastroenterology	11
Cardiology	39
Obstetrics/Gynecology	186
Urology	73
Dermatology	51
Allergy/Clinical Immunology	18
Anesthesiology	64
Pediatrics	271
Pediatric Cardiology	4
Pediatric Neurology	4
Opthalmology	63
Otorhinolaryngology	58
Child Psychiatry	14
Neurology	45
Psychiatry	149
Hematology	5
Nephrology	9
Medical Onocology	5
Endocrinology	15
Rheumatology	3
Internal Medicine	414
Infectious Diseases	9
Family Medicine	181
General Surgery	315
Thoracic Surgery	31

TABLE III continued

SPECIALTY	TOTAL
Plastic Surgery	17
Orthopedic Surgery	142
Flight Surgeon	127
Physiatry	17
Therapeutic Radiology	5
Diagnostic Radiology	49
Radiology	41
Pathology, Anatomical	15
Pathology	152
Pathology, Clinical	3
Neuro Surgery	25
TOTAL	4,166

TABLE IV

TOTAL AIR FORCE PHYSICIANS BY SPECIALTY
(30 July 1978)

SPECIALTY	WORK FORCE/TRAINING	TOTAL
Staff Clinician	021/000	29
General Duty Physician	252/026	278
Preventive Medicine	003/001	4
Occupational Medicine	001/000	1
Family Medicine	176/126	302
Aerospace Medicine	509/013	522
Pediatrics	187/063	250
Pediatric Subspecialties:		
Allergy	006/005	11
Adolescent Medicine	001/002	3
Cardiology	006/002	8
Perinatology	005/002	7
Metabolic Diseases	001/000	1
Hematology	002/001	3
Neurology	002/003	5
Infectious Diseases	002/003	5
Medical Genetics	000/001	1
Internal Medicine	142/095	238
Internal Medicine Subspecialties:		
Allergy	006/006	12
Oncology	002/001	3
Cardiology	022/010	32
Endocrinology	010/003	13
Gastroenterology	020/009	29
Hematology	009/004	13
Rheumatology	009/001	10
Pulmonary Diseases	014/006	20
Infectious Diseases	004/003	7
Nephrology	010/002	12
Nuclear Medicine	002/002	4

TABLE IV continued

SPECIALTY	WORK FORCE/TRAINING	TOTAL
Emergency Medicine	012/010	22
Surgery	176/082	258
Surgery Subspecialties:		
Thoracic	009/004	13
Colon and Rectal	001/000	1
Cardiac	002/000	2
Pediatric	001/001	2
Neurological	011/006	17
Plastic	008/004	12
Urology	043/016	59
Opthalmology	042/014	56
Otorhinolaryngology	041/014	55
Orthopedic Surgery	082/030	112
Hand Surgery	001/001	2
Obstetrics and Gynecology	142/054	196
Obstetrics and Gynecology Subspecialties:		
Endocrinology	004/002	6
Oncology	005/001	6
Pathology	001/001	2
Perinatology	001/000	1
Pathology	063/013	76
Neuropathology	001/000	1
Radiology	072/047	119
Radiology Subspecialties:		
Radiation Therapy	002/003	5
Neuro-Radiology	000/001	1
Nuclear Medicine	003/001	4
Diagnostic	003/002	5
Dermatology	032/011	43
Anesthesiology	047/017	64
Neurology	021/005	26
Psychiatry	108/024	132

TABLE IV continued

SPECIALTY	WORK FORCE/TRAINING	TOTAL
Psychiatry Subspecialties:		
Child Psychiatry	005/000	5
Psychoanalyst	000/001	1
Medical Research Director	001/000	1
Scientist, Medical/Biomedical	001/000	1
TOTALS	756/2394	3,150[a]

a: Includes 21 MD's not identified by specialty

TABLE V

MILITARY ACTIVE DUTY PHYSICIAN FORCE
(1978)

SPECIALTY	NAVY	% OF TOTAL FORCE	ARMY	% OF TOTAL FORCE	AIR FORCE	% OF TOTAL FORCE
Anesthesiology	145	(4.15)	64	(1.54)	64	(2.03)
Dermatology	67	(1.92)	51	(1.22)	43	(1.37)
Executive Medicine	105	(3.01)	48	(1.15)	NO DATA	
Family Practice	230	(6.59)	181	(4.34)	302	(9.59)
Internal Medicine	221	(6.33)	414	(9.94)	238	(7.56)
Internal Medicine Subspecialties:		(5.18)		(3.17)		(4.76)
Allergy/Immunology	2		18		11	
Cardiology	36		39		32	
Endocrinology/Metabolism	19		15		13	
Gastroenterology	32		11		29	
Hematology	33		5		13	
Infectious Diseases	10		9		7	
Nephrology	10		9		12	
Oncology	1		5		3	
Pulmonary Medicine	27		18		20	
Rheumatology	8		3		10	
Tropical Medicine	3		0		0	
Neurology	32	(0.92)	45	(1.08)	26	(0.83)
Nuclear Medicine	9	(0.26)	11	(0.26)	4	(0.13)
Obstetrics/Gynecology[a]	193	(5.53)	186	(4.46)	211	(6.70)
Otorhinolaryngology	87	(2.49)	58	(1.39)	55	(1.75)
Ophthalmology[a]	87	(2.49)	63	(1.51)	56	(1.78)
Pathology[a]	127	(3.64)	170	(4.08)	77	(2.44)
Pediatrics[a]	249	(7.13)	279	(6.70)	294	(9.33)
Preventive Medicine[b]	76	(2.18)	56	(1.34)	5	(0.16)
Primary Care[c]	641	(18.36)	1,530	(36.73)	822	(26.10)
Psychiatry[a]	129	(3.69)	163	(3.91)	138	(4.38)
Radiology[a]	128	(3.67)	95	(2.28)	134	(4.25)

TABLE V continued

SPECIALTY	NAVY	% OF TOTAL FORCE	ARMY	% OF TOTAL FORCE	AIR FORCE	% OF TOTAL FORCE
Surgery[a]	412	(11.80)	530	(12.72)	419	(13.30)
Urology	67	(1.92)	73	(1.75)	59	(1.87)
Others[d]	306	(8.76)	17	(0.41)	52	(1.65)
TOTALS	3,492	(100)	4,166	(100)	3,150	(100)

a = an aggregate total, including subspecialties

b = an aggregate total, including occupational medicine, public health, and general and aerospace preventive medicine

c = An aggregate total, including:

Navy -- Flight Surgeons, Submarine Medicine, Emergency Medicine and is thought to contain General Medical Officers

Army -- General Medical Officers and Flight Surgeons

Air Force -- General Medical Officers, Aerospace Medicine, and Emergency Medicine

d = an aggregate total of all others not listed, as their specialty title is unique to their military branch

total health care demands on each of the service's medical departments, these figures tend to indicate that the Navy, with its smaller percentage of primary care physicians, would have a need for a non-physician provider force whose total strength, expressed as a percentage of total medical department personnel, would be larger than that of the Air Force or Army. Of course, this assumption dosen't consider differences in mission or productivity between the military services, but it is an area for further research.

Table VI is a comparative description of military nurses, by service and by rank. Included within these totals are the nurse practitioners of each service.

Tables VII, VIII, and IX show the breakdown of the Navy, Army, and Air Force nurse forces by specialty. The Army data did not allow the numbers of nurse practitioners to be obtained. Thus, while the number of Army NPs are contained within the Table VIII totals, the Army uses an Additional Skill Identifier (ASI), to identify NPs within a primary specialty.

Table X is a description of total military nurse practitioners, by service and by specialty. The original data provided by the Army led to some confusion as to the actual number of nurse practitioners in the Army Nurse Corps, as the Army assigns the ASI, "8E--extended role nurse", to nurses within almost all of its primary specialties (a total of 296 nurses with "8E" designators). Data as to those actually considered to be nurse practitioners was later

TABLE VI

TOTAL MILITARY NURSES BY RANK
(1978)

RANK	NAVY	ARMY	AIR FORCE
Rear Admiral, Lower/Brig. General (O-7)	1	1	1
Captain/Colonel (O-6)	49	76	43
Commander/LT-Colonel (O-5)	166	196	297
LT-Commander/Major (O-4)	328	521	587
Lieutenant/Captain (O-3)	1,022	1,888	1,520
LT-Junior Grade/1st Lieutenant (O-2)	672	933	1,085
Ensign/2nd Lieutenant (O-1)	333	263	226
TOTAL	2,571[a]	3,877[b]	3,759[c]

a = as of 1 July 1978

b = as of 18 September 1978

c = as of 30 July 1978

TABLE VII

NAVY NURSE CORPS OFFICERS BY PRIMARY SUBSPECIALTY
As of 28 August 1978

PRIMARY SUBSPECIALTY	TOTAL
General Nursing	1,501
Nursing Administration	106
Health Care Administration	1
Nursing Education	67
Counseling and Guidance	5
Medical/Surgical Nursing	26
Medical Nursing	36
Surgical Nursing	93
Respiratory Care	1
Maternal and Child Health	3
Obstetrical Nursing	39
Pediatric Nursing	24
Neuropsychiatric Nursing	23
Orthopedic Nursing	32
Community Health	42
Emergency Nursing	34
Operating Room Nursing	142
Critical Care Nursing (general)	8
Surgical Intensive Care Nursing	89
Medical Intensive Care Nursing	32
Coronary Care Nursing	48
Neonatal Intensive Care Nursing	10
Hemodialysis Nursing	3
Anesthesia	69
Pediatric Nurse Practitioner	22
Family Nurse Practitioner	38
OB/GYN Nurse Practitioner	18
Nurse Midwife	5
Manpower & Personnel Management	5
Duty Under Instruction	85
TOTAL	2,607

TABLE VIII

TOTAL ARMY NURSES BY SPECIALTY
(As of September 1978)

SPECIALTY	TOTAL
Nurse Administrator	65
Community Health Nurse	130
Psychiatric/Mental Health	162
Pediatric Nurse	254
Operating Room Nurse	270
Nurse Anesthetist	228
Obstetric/Gynecological	226
Medical-Surgical Nurse	1,714
Clinical Nurse	828
TOTAL	3,877

TABLE IX

TOTAL AIR FORCE NURSES BY SPECIALTY
(As of 30 July 1978)

SPECIALTY	TRAINING/WORK FORCE	TOTAL
Occupational Therapy	000/001	1
Nursing Administrator	001/184	185
Mental Health Nurse	001/139	140
Mental Health Specialist	000/001	1
Operating Room Nurse	007/253	260
Nurse Anesthetist	027/209	236
Clinical Nurse	076/2263	2,339
Nurse Practitioners:		
OB-GYN	001/113	114
Pediatrics	000/121	121
Primary Care	001/102	103
Nurse-Midwife	000/048	48
Education Coordinator	000/021	21
Flight Nurse	000/154	154
Environmental Health	001/033	34
TOTAL		3,759

TABLE X

TOTAL MILITARY NURSE PRACTITIONERS
(1978)

SPECIALTY	NAVY[a]	ARMY[b]	AIR FORCE[c]
Adult Care/Family Practice	38	53	0
Psychiatry	0	17	0
Obstetrics/Gynecology	18	28	114
Pediatrics	22	52	121
Primary Care	0	0	103
Nurse Midwife	5	(no data)	48
TOTALS	83	150	386
Totals as a percentage of total nursing force:	3.23%	3.87%	10.27%

a: as of 28 August 1978

b: as of August 1978

c: as of 30 July 1978

provided, and is reflected in Table X.

Table X indicates that the Air Force utilizes almost three times as much of its total military nursing force in NP roles than does the Navy and the Army.

Table XI indicates the total number of PAS in the Navy, and gives data on their utilization by type of activity. Almost 60 percent are utilized within Naval Regional Medical Centers, both within the continental United States (CONUS) and overseas. Another 15 percent are utilized within Naval Hospitals, leaving roughly 25 percent to be utilized in the smaller clinic-type settings. Of the total, approximately 20 percent are in overseas settings, while 80 percent are stationed within CONUS.

Table XII provides a similar utilization pattern for the 414 Army PAs. Approximately 33 percent, or one-third of the Army PAs are billeted in overseas assignments. Slightly over 70 percent are utilized in combat unit settings, which reflects the previously discussed goal of the Army to utilize the PA as a replacement for the battalion general medical officers.

Table XIII provides the breakdown of the Air Force's 366 PAs, by base. Of this total, approximately 15 percent are utilized at overseas locations. The data does not allow for further comparison by size or type of medical facility.

Table XIV shows the totals and rank structure for the MHCS Medical Service Corps community. Footnotes to the table explain differences, the most important being that the

TABLE XI

TOTAL NAVY PHYSICIANS ASSISTANTS
BY TYPE OF ASSIGNMENT
(as of November 1978)

ASSIGNMENT[a]	% OF TOTAL FORCE	TOTAL
Naval Regional Medical Centers, CONUS[b]	(50.00)	119
Naval Regional Medical Centers, Overseas	(9.66)	23
Naval Hospitals, CONUS	(12.61)	30
Naval Hospitals, Overseas	(2.10)	5
Branch Clinics, CONUS	(15.58)	37
Branch Clinics, Overseas	(5.04)	12
Naval Regional Medical Clinics, CONUS	(1.26)	3
Naval Regional Medical Clinics, Overseas	(2.94)	7
Other CONUS Activities	(0.42)	1
Marine Corps Units	(0.42)	1
TOTAL FORCE	(100.00)	238

a = includes a total of 70 duty stations

b = includes the National Naval Medical Center, Bethesda, Maryland and the Submarine Medical Center, New London, CT

TABLE XII

TOTAL ARMY PHYSICIANS ASSISTANTS
BY TYPE OF ACTIVITY/UNIT
(as of September 1978)

UNIT[a]	CONUS	OVERSEAS	TOTAL
Engineering Battalion	10	10	20
Infantry Battalion	64	39	103
Infantry, Headquarters & Headquarters Company	1	0	1
Field Artillery Battalion	37	32	69
Field Artillery Group	0	2	2
Field Artillery Battery	0	1	1
Armor Battalion	22	19	41
Armored Calvary	3	1	4
Calvary Squadron	8	4	12
Calvary Battalion	6	1	7
Calvary Troop	1	0	1
Calvary Headquarters & Headquarters Company	1	0	1
Air Defense Artillery	7	10	17
Support Battalion	1	0	1
Replacement Company	1	0	1
Medical Battalion	3	0	3
Station Hospital	0	1	1
General Dispensary	0	5	5
Medical Detachment	0	7	7
Army Medical Department Activity	80	2	82
Army Medical Center	11	0	11
Army Medical Command	0	1	1
Garrison Headquarters	1	0	1
Reserve Personnel & Administration Center	15	0	15
TOTALS	272	136	414[b]

a: includes a total of 315 separate units

b: includes 6 PAs not identified by activity

TABLE XIII

PHYSICIAN ASSISTANTS, AIR FORCE BY BASE
(Not broken down by officer or enlisted)
as of October 1978

BASE AND LOCATION	Number of PAs
Eielson AFB, Alaska	2
Elmendorf AFB, Alaska	8
Duluth AFB, MN	3
Hancock Field, NY	1
Peterson AFB, CO	3
Tyndall AFB, FL	4
Air Force Academy, CO	6
RAF Alconbury, England	1
RAF Rentwaters, England	1
Bitburg AB, Germany	2
RAF Chicksands, England	1
Hahn AB, Germany	2
Incirlik CDI, Turkey	1
RAF Lakenheath, England	2
Ramstein AB, Germany	3
Rhein Main AFB, Germany	2
Senbach, AB, Germany	1
Spangdahlem AB, Germany	1
RAF Upper Heyford, England	3
Weisbaden AB, Germany	1
Zaragoza AB, Spain	1
Zweibrucken AB, Germany	1
Hassisch-Olderdorf, Germany	1
Hill AFB, UT	2
Kelley, AFB, TX	2
McClellan AFB, CA	4
Robins AFB, GA	3
Tinker AFB, OK	4
Wright-Patterson, OH	4
Brooks AFB, TX	1
Edwards AFB, CA	4
Egland	4
Hanscom AFB, MA	2
Lackland AFB, TX	9
Patrick AFB, FL	7
Chanute AFB, IL	7
Columbus AFB, MS	3
Keesler AFB, MS	6
Laughlin AFB, TX	2
Lowry AFB, CO	4
Mather AFB, CA	5
Randolph AFB, TX	4
Reese AFB, TX	3
Sheppard AFB, TX	4
School of Health Care Sciences, TX	4

TABLE XIII continued

BASE AND LOCATION	Number of PAs
Vance AFB, OK	2
Williams AFB, AZ	3
Madenna	1
Goodfellow AFB, TX	2
Maxwell AFB, AL	6
White House, Washington, D.C.	1
Air Force Medical Service Center	1
Altus AFB, OK	3
Andrews AFB, MD	5
Charleston AFB, SC	2
Dover AFB, DL	2
Little Rock, ARK	3
Norton AFB, CA	2
Pope AFB, NC	2
Kirtland AFB, NM	3
Scott AFB, IL	4
Travis AFB, CA	4
Bolling AFB, Washington, D.C.	2
Clark AB, Phillipines	3
Hickam AFB, HI	2
Kadena AB, Japan	3
Kunsan AB, Korea	2
Misawa AB, Japan	1
Osan AB, Korea	2
Yokota AB, Japan	3
Anderson AFB, Guam	2
Barksdale AFB, LA	5
Beale AFB, CA	3
Blytheville AFB, AR	2
Carswell AFB, TX	5
Castle AFB, CA	4
Dyess AFB, TX	5
Ellsworth AFB, SD	5
Fairchild AFB, WA	5
F.E. Warren AFB, WY	4
Grand Forks, AFB, ND	5
Griffiss AFB, NY	3
Grissom AFB, IN	3
K.I. Sawyer AFB, MI	4
Loring AFB, ME	2
McConnell AFB, KA	2
Malestrom AFB, MT	3
March AFB, CA	6
Minot AFB, ND	5
Offutt AFB, NB	7
Pease AFB, NH	4
Plattsburgh AFB, NY	3
Rickenbacker AFB, OH	3
Vandenberg AFB, CA	3

TABLE XIII continued

BASE AND LOCATION	Number of PAs
Whiteman AFB, MO	4
Wurthsmith AFB, MI	4
Bergstrom AFB, TX	4
Cannon AFB, MN	3
England AFB, LA	2
George AFB, CA	2
Holloman AFB, NM	3
Homestead AFB, FL	10
Howard AFB, Canal Zone	2
Langley AFB, VA	5
Luke AFB, AZ	6
Macdill AFB, FL	5
Moody AFB, GA	1
Mountain Home AFB, ID	2
Myrtle Beach AFB, SC	2
Nellis AFB, NV	5
Seymour Johnson AFB, NC	2
Shaw AFB, SC	2
Davis-Monthan AFB, AZ	2
GRAND TOTAL	366

TABLE XIV

TOTAL MILITARY MEDICAL SERVICE CORPS OFFICERS BY RANK
(1978)

RANK	NAVY	ARMY	AIR FORCE[a]
Rear Admiral,Lower/Brig. General (O-7)	0	1	1
Captain/Colonel (O-6)	40	148	72
Commander/LT-Colonel (O-5)	145	544	244
LT-Commander/Major (O-4)	460	883	400
Lieutenant/Captain (O-3)	779	1,688	1,183
LT-Junior Grade/1st Lieutenant (O-2)	247	787	363
Ensign/2nd Lieutenant (O-1)	93	589	308
TOTALS	1,773[d]	4,639[b]	2,571[c]

a: Includes the Air Force Biomedical Science Corps personnel so that the data is comparable to the Army and Navy data.

b: Excludes the data from the Army Medical Specialty Corps which is composed of 75 Occupational Therapists, 187 Physical Therapists, and 192 Dieticians. This corps was excluded as data was not available as to their ranks.

c: Total includes 258 Physician Assistants who, upon receiving Officer Commissions in the Air Force, became a part of the Air Force Biomedical Service Corps. The Army and Navy totals do not reflect any Physician Assistants.

d: Total includes 8 Navy MSC Officers whose rank could not be determined from the data.

Air Force structure includes the membership of its Biomedical Science Corps, so that the data is comparable between the services.

A breakdown of the Navy Medical Service Corps is depicted in Table XV. Fifty-five percent of these officers are in allied health specialties, while 45 percent are health care administrators. The total force consists of 1,773 men and women.

A similar breakdown for the Army's 4,639-member Medical Service Corps is shown in Table XVI. The Army uses a more extensive listing of specialties than does the Navy. While limiting its health care administration specialists to less than two percent of total force, many of the duties performed within other specialty areas are of an administrative nature. The Army, as does the Air Force but not the Navy, has a cadre of social workers within its Medical Service Corps structure.

The breakdown of the Army Medical Specialty Corps is contained in Table XVII. The functions performed by these officers are performed within the Navy's Medical Service Corps structure and in the Biomedical Sciences Corps of the Air Force.

Table XVIII shows the breakdown of the Air Force Medical Service Corps. Officers within this corps are utilized only in administrative positions.

The Air Force Biomedical Service Corps, contains officers in allied health specialties, as shown in Table XIX.

TABLE XV

NAVY MEDICAL SERVICE CORPS BY SPECIALTY
(as of September 1978)

SPECIALTY	TOTAL	% OF TOTAL FORCE
Health Care Administration	798	(45.03)
Financial Management	27	(1.52)
Personnel Management	23	(1.30)
Medical Supply Administration	4	(0.23)
Food Service	28	(1.58)
Operations Management	4	(0.23)
Microbiology	53	(2.99)
Radiation Health	35	(1.98)
Radiation Specialist	27	(1.52)
Physiologist	10	(0.56)
Aerospace Physiologist	49	(2.77)
Clinical Psychologist	80	(4.51)
Pharmacologist	2	(0.11)
Aerospace Experimental Psychologist	32	(1.81)
Research Psychologist	12	(0.68)
Entomologist	25	(1.41)
Environmental Health	77	(4.35)
Industrial Hygiene	36	(2.03)
Medical Technologist	52	(2.93)
Physical Therapist	51	(2.88)
Occupational Therapist	17	(0.96)
Dietician, Therapeutic	27	(1.52)
Dietician, Food Management	5	(0.28)
Optometrist	110	(6.21)
Pharmacist	109	(6.15)
Podiatrist	17	(0.96)
Biochemist	35	(1.98)
Unidentified	28	(1.58)
TOTAL	1,773	(100.00)

TABLE XVI

ARMY MEDICAL SERVICE CORPS BY SPECIALTY
(as of 18 September 1978)

SPECIALTY	TOTAL	% OF TOTAL FORCE
Health Care Administration	86	(1.85)
Field Medical Assistant	1,438	(31.00)
Comptroller	106	(2.28)
Biomedical Information Systems	80	(1.72)
Patient Administration	181	(3.90)
Personnel Management	309	(6.66)
Manpower Control	6	(0.13)
Plans, Operations, Intelligence & Training	131	(2.82)
Aeromedical Evacuation	330	(7.11)
Material	369	(7.95)
Health Facilities Planning	21	(0.45)
Microbiologist	59	(1.27)
Nuclear Medical Science	44	(0.95)
Biochemist	91	(1.96)
Paristologist	16	(0.34)
Immunologist	21	(0.45)
Clinical Laboratory	90	(1.94)
Entomologist	75	(1.62)
Pharmacist	219	(4.72)
Physiologist	14	(0.30)
Optometrist	190	(4.10)
Podiatrist	56	(1.21)
Audiologist	56	(1.21)
Environmental Science	116	(2.50)
Sanitary Engineer	110	(2.37)
Community Oral Health	0	(0)
Social Worker	284	(6.12)
Psychologist	96	(2.07)
Research Psychologist	38	(0.82)
Behaviroal Science Associate	7	(0.15)
TOTAL	4,639	(100.00)

TABLE XVII

ARMY MEDICAL SPECIALTY CORPS BY SPECIALTY
(as of 18 September 1978)

SPECIALTY	TOTAL	% OF TOTAL FORCE
Occupational Therapist	75	(16.52)
Physical Therapist	187	(41.19)
Dietician	192	(42.29)
TOTAL	454	(100.00)

TABLE XVIII

AIR FORCE MEDICAL SERVICE CORPS BY SPECIALTY
(as of 30 July 1978)

SPECIALTY	TOTAL	% OF TOTAL FORCE
Health Services Administrator, Staff	449	(43.80)
Health Services Administrator	572	(55.80)
Others	4	(0.39)
TOTAL	1,025	(100.00)

TABLE XIX

AIR FORCE BIOMEDICAL SCIENCES CORPS BY SPECIALTY
(as of 30 July 1978)

SPECIALTY	TOTAL	TOTAL FORCE
Bioenvironmental Engineer, Staff	58	(3.75)
Bioenvironmental Engineer:		
General	126	(8.16)
Industrial Hygiene	10	(0.65)
Medical Construction	10	(0.65)
Sanitary	14	(0.91)
Biomedical Engineer	6	(0.39)
Other	3	(0.19)
Entomologist	14	(0.91)
Biomedical Scientist	19	(1.23)
Biomedical Laboratory:		
Laboratory Science	103	(6.67)
Microbiology	12	(0.78)
Chemistry	20	(1.29)
Hematology	0	(0)
Blood Bank	4	(0.26)
Other	9	(0.58)
Aerospace Physiologist	69	(4.47)
Health Physicist	19	(1.23)
Clinical Psychologist	113	(7.31)
Clinical Research Psychologist	0	(0)
Clinical Neuropsychologist	3	(0.19)
Social Worker	129	(8.35)
Dietician	79	(5.11)
Occupational Therapist	29	(1.88)
Physical Therapist	85	(5.50)
Pharmacist	125	(8.10)
Optometrist	166	(10.74)
Biomedical Specialist:		
Audiologist	10	(0.65)
Speech	1	(0.06)
Other	7	(0.45)
Podiatrist	33	(2.14)
Physicians Assistant	258	(16.70)
Medical Research	4	(0.26)
Scientist, Medical/Biomedical	3	(0.19)
Others	4	(0.26)
TOTAL	1,545	(100.00)

While the field of dentistry within the MHCS has yet to see wide utilization of non-physician providers, in keeping with the systems approach to military health care a breakdown of Military Dental Corps officers is depicted in Table XX. Further breakdowns by specialty for the Navy, Army, and Air Force Dental Corps' are shown in Tables XXI, XXII, and XXIII, respectively.

In describing the personnel comprising the MHCS, it is very important to include the enlisted members of each service's medical department, for these ancillary health care personnel are a vital link in the total health care system. In terms of number of personnel, they are the largest single cadre of health care personnel within the MHCS.

Table XXIV contains a breakdown of Navy enlisted medical personnel by specialty. Unfortunately, the listing is incomplete as it does not include those enlisted personnel serving in dental-related specialties. This data was requested from Navy sources, but has not been furnished.

A similar breakdown of Army enlisted medical personnel is presented in Table XXV, while the Air Force enlisted medical personnel data is shown in Table XXVI. The data contained in both of these tables does include enlisted personnel within dental specialty areas. Both the Army and Air Force enlisted breakdowns include a number of personnel assigned within veterinary specialties, while the Navy data does not. This occurs because the Army and Air Force each have a Veterinary Corps comprised of officers within various veterinary specialties. The Navy has no veterinary corps, but instead utilizes the

TABLE XX

TOTAL MILITARY DENTAL CORPS OFFICERS BY RANK
(1978)

RANK	NAVY	ARMY	AIR FORCE
Rear Admiral, Upper/Maj General (O-8)	1	1	1
Rear Admiral, Lower/Brig General (O-7)	3	2	0
Captain/Colonel (O-6)	329	253	193
Commander/LT-Colonel (O-5)	277	333	293
LT-Commander/Major (O-4)	318	345	279
Lieutenant/Captain (O-3)	748	845	648
TOTALS	1,676	1,776	1,414

TABLE XXI

TOTAL NAVY DENTAL CORPS BY SPECIALTY
(as of 18 August 1978)

SPECIALTY	TOTAL	% OF TOTAL FORCE
General Practitioner	1,305	(77.86)
Endodontist	54	(3.22)
Prosthodontist	84	(5.01)
Periodontist	62	(3.70)
Comprehensive Dentist	33	(1.97)
Operative Dentistry	17	(1.01)
Orthodontist	5	(0.30)
Pedodontist	3	(0.18)
Dental Research	5	(0.30)
Dental Education	2	(0.12)
Oral Pathology	6	(0.36)
Oral Diagnosis	13	(0.78)
Preventive Dentistry	7	(0.42)
TOTAL	1,676	(100.00)

TABLE XXII

TOTAL ARMY DENTAL CORPS BY SPECIALTY
(as of December 1978)

SPECIALTY	TOTAL	% OF TOTAL FORCE
Dental Officer	1,083	(60.98)
General Dental Officer	171	(9.63)
Oral Medicine	9	(0.51)
Periodontist	84	(4.73)
Endodontist	51	(2.87)
Prosthodontist, Fixed	77	(4.34)
Prosthodontist, Removable	94	(5.29)
Preventive Dentistry	18	(1.01)
Pedodontist	30	(1.69)
Orthodontist	42	(2.36)
Oral Surgeon	82	(4.50)
Oral Pathologist	20	(1.13)
Executive Dental Officer	15	(0.84)
TOTAL	1,776	(100.00)

TABLE XXIII

TOTAL AIR FORCE DENTAL CORPS BY SPECIALTY
(as of 30 July 1978)

SPECIALTY	TOTAL	% OF TOTAL FORCE
Dental Staff Officer	61	(4.27)
General Dentistry	972	(68.11)
Oral Surgeon	90	(6.31)
Periodontist	95	(6.66)
Prosthodontist	116	(8.13)
Prosthodontist, Fixed	4	(0.28
Prosthodontist, Removable	3	(0.21)
Orthodontist	27	(1.89)
Oral Pathologist	7	(0.49)
Endodontist	48	(3.36)
Other	4	(0.28)
TOTALS	1,427	(100.00)

TABLE XXIV

MEDICAL PERSONNEL, NAVY ENLISTED
as of 17 October 1978

JOB TITLE	DESIGNATOR	TOTAL
General Duty	0000	12,212
Nuclear Medicine Submarine Tech	8402	310
Medical Field Service Tech	8404	2,371
Aerospace Medicine Tech	8406	447
Nuclear Medicine Tech	8407	56
Cardiopulmonary Tech	8408	90
Aerospace Physiology Tech	8409	91
Clinical Nuclear Medicine Tech	8416	76
Physician's Assistant Trainee	8422	4
Advanced Medical Services Tech	8425	1,088
Preventive Medicine Tech	8432	484
Transportation Tech	8433	50
Ocular Tech	8444	121
Advanced Ocular Tech	8445	64
Otolaryngology Tech	8446	105
X-ray Tech	8452	772
Electroencephalogy Tech	8454	43
Optician Tech	8463	164
Physical and Occupational Therapy Tech	8466	178
Photography Tech	8472	41
Biomedical Equipment Tech, Basic	8477	98
Biomedical Equipment Tech, X-ray	8478	82
Biomedical Equipment Tech, Electronic	8479	88
Pharmacy Tech	8482	704
Operating Room Tech	8483	801
Neuropsychiatry Tech	8485	333
Urological Tech	8486	78
Orthopedic Cast Room Tech	8489	100
Special Operations Tech	8492	81
Medical Deep Sea Diving Tech	8493	109
Dermatology Tech	8495	47
Embalming Tech	8496	8
Laboratory Tech, Basic	8501	436
Histology Tech, Basic	8502	17
Histology Tech, Advanced	8503	17
Cytology Tech, Basic	8504	16
Cytotechnologist Tech	8505	14
Medical Laboratory Tech, Advanced	8506	809
Medical Technologist	8507	134
Nuclear Power Plant Operator	3391	9
Unassigned Status	9999	14
TOTAL		22,762

TABLE XXV

MEDICAL PERSONNEL, ARMY ENLISTED
as of October, 1978

JOB TITLE	MOS	TOTAL
Biological Sciences Assistant	01H	167
Biomedical Equipment Repairer	35G	185
Electronic Biomedical Equipment Repairer	35S	92
X-ray Biomedical Equipment Repairer	35T	176
Biomedical Equipment Maintenance Chief	35U	53
Orthotic (Brace) Specialist	42C	68
Dental Lab Specialist	42D	500
Optical Lab Specialist	42E	170
Patient Administrative Specialist	71G	1,423
Medical Supply Specialist	76J	1,187
Medical Specialist	91B	16,240
Clinical Specialist	91C	4,736
Operating Room Specialist	91D	1,759
Dental Specialist	91E	1,863
Psychiatric Specialist	91F	506
Orthopedic Specialist	91H	232
Physical Therapy Specialist	91J	193
Occupational Therapy Specialist	91L	69
Cardiac Specialist	91N	178
Behavioral Science Specialist	91G	815
X-ray Specialist	91P	1,025
Pharmacy Specialist	91Q	728
Veterinary Specialist	91R	1,106
Environmental Health Specialist	91S	596
Animal Specialist	91T	244
ENT Specialist	91U	159
Respiratory Specialist	91V	162
Nuclear Medicine Specialist	91W	51
Eye Specialist	91Y	269
Medical Laboratory Specialist	92B	2,041
Hospital Food Service Specialist	94F	712
TOTAL		37,705

TABLE XXVI

MEDICAL PERSONNEL, AIR FORCE ENLISTED
as of June 1978

JOB TITLE	AFSC DESIGNATOR	TOTAL
Medical Illustrator	231X1A	11
Medical Photographer	232X0A	11
Biomedical Equipment Maintenance	403X0	406
Diet Therapy	622X1	491
Aeromedicine Specialist	901X0	6,790
Operating Room Specialist	902X2	982
Radiology	903X0	1,077
Medical Laboratory Specialist	904X0	1,586
Histopathology Specialist	904X1	93
Cytotechnology Specialist	904X2	35
Pharmacy Specialist	905X0	778
Medical Administration	906X0	3,221
Environmental Health Specialist	907X0	573
Veterinary Specialist	908X0	951
Nuclear Medicine Specialist	909X0	47
Neurology Technician	909X2	32
Physiological Training Specialist	911X0	444
Opthalmology Surgical Specialist	912X0	58
Otolaryngology Surgical Specialist	912X1	61
Urology Surgical Specialist	912X2	45
Orthopedic Clinic Specialist	912X3	136
Allergy/Immunology Specialist	912X4	203
Optometry Specialist	912X5	165
Physical Therapy Specialist	913X0	237
Occupational Therapy Specialist	913X1	59
Orthopedic Appliance Specialist	913X2	41
Mental Health Clinic Specialist	914X0	281
Mental Health Ward Specialist	914X1	282
Medical Material Specialist	915X0	1,232
Cardio Pulmonary Laboratory Specialist	916X0	154
GRAND TOTAL		20,451

ENLISTED PHYSICIAN ASSISTANTS, Air Force
as of June 1978

Physician Assistants	917X0	362

DENTAL TECHNICIANS, Air Force
as of June 1978

Dental Assistants	918X0	2,156
Preventive Dentistry Specialist	981X1	462
Dental Laboratory Specialist	982X0	672
Dental Assistant	983X0	110
GRAND TOTAL		3,400

veterinary services of the Army. Thus, the Navy has no requirement for enlisted technicians within veterinary specialties. The author has chosen not to include data on the officers within the Army and Air Force Veterinary Corps' as their functions, while being medically important, are considered to be outside the mainstream of health care activities which directly impact upon, or are impacted by, the utilization of non-physician providers.

Another important group of personnel that must be included in order to give a complete picture of the composition of the MHCS, is the group of federally employed Civil Service health care personnel. Table XXVII gives a composite breakdown of all full time civilian health care personnel who are employed by the Department of Defense (DoD). These personnel are those referred to as "white collar" workers and are paid in accordance with the Civil Service Commissions' General Schedule (GS). This table ignores, by intent, other federal employees who may be employed in health care settings. These other federal employees are referred to as "blue collar" workers and are renumerated in accordance with federal Wage Board or Wage Grade tables. The intent in omitting these employees is not be belittle their contributions to health care settings, but is to separate those skills which can be used in multiple settings other than health care (i.e., janitors, plumbers, accountants, etc.), from those directly involved in patient care.

TABLE XXVII

FULL TIME FEDERAL (CIVILIAN) MEDICAL PERSONNEL
EMPLOYED BY THE DEPARTMENT OF THE DEFENSE
(DoD)
as of June 1978

JOB SERIES/TITLE	ARMY	NAVY	AIR FORCE	OTHER DoD	TOTAL
00601/General Health Science	12	1	0	5	18
00602/Medical Officer	479	107	163	2	751
00603/Physician's Assistant	2	4	6	0	12
00605/Nurse Anesthetist	6	0	0	0	6
00610/Nurse	2,028	888	780	19	3,715
00615/Public Health Nurse	3	0	0	0	3
00621/Nursing Assistant	1,956	791	711	1	3,459
00622/Medical Aide, Sterile Supplies	109	27	8	0	144
00625/Autopsy Assistant	9	3	1	0	13
00630/Dietician	8	5	1	0	14
00631/Occupational Therapist	0	1	0	0	1
00633/Physical Therapist	2	2	4	0	8
00635/Corrective Therapist	1	0	0	0	1
00636/Rehabilitation Therapy Asst.	36	0	0	0	36
00642/Nuclear Medicine Technician	31	2	3	0	36
00644/Medical Technologist	470	96	110	7	683
00645/Medical Technician	482	98	98	4	682
00646/Pathology Technician	108	47	16	2	173
00647/Medical Radiology Technician	343	31	69	0	443
00649/Medical Machine Technician	190	32	42	0	264
00660/Pharmacist	231	29	30	4	294
00661/Pharmacy Assistant	92	9	13	0	114
00662/Optometrist	13	10	7	0	30
00664/Restoration Technician	3	0	1	0	4
00665/Speech Pathology & Audiology	34	24	7	0	65
00667/Orthotist and Prosthetist	37	6	6	2	51
00668/Podiatrist	3	0	0	0	3
00669/Medical Record Librarian	47	14	39	1	101
00670/Hospital Administration	15	1	4	0	20
00673/Hospital Housekeeping Mgm't	21	16	6	0	43
00675/Medical Records Technician	421	167	177	1	766
00680/Dental Officer	2	0	2	0	4
00681/Dental Assistant	1,021	182	100	0	1,303
00682/Dental Hygiene	89	54	37	0	180
00683/Dental Laboratory Technician	207	16	40	0	263
00684/Public Health Dental Hygiene	18	0	0	0	18
00685/Public Health Program Specialist	1	0	0	0	1
00688/Sanitarian	5	3	1	0	9
00690/Industrial Hygiene	21	47	12	3	83
00693/Environmental Health Tech.	44	16	5	0	65
00699/Health Aide & Technician	800	131	240	3	1,174
TOTALS	9,400	2,860	2,739	54	15,053

Table XXVII also omits those federal health care workers employed on a part time basis. Attempts to obtain meaningful data on that category of employees were not successful.

Data on the breakdown of the civilian employees in Table XXVII by grade distribution is shown in Table XXVIII. The average salary grade for each of the military services and for DoD as a total is also depicted. The Army, which employs over 62 percent of all DoD civilian health care personnel, has a slightly lower average salary grade than do the other DoD entitys.

A. CHAPTER SUMMARY

In summary, while the range of health care provider-types is basically similar in each of the military medical departments, there are some structural differences in addition to variations in the relative percentages of specialists within a particular provider-force.

The major structural difference in the three services is found in the areas of health care administrators and biomedical science specialists. Each of these classes of health care personnel are incorporated into the Navy's Medical Service Corps. However, for comparability the Navy Medical Service Corps equates to the Army's Medical Service Corps plus the Army Medical Specialty Corps, and to the Air Force Medical Service Corps plus the Air Force Biomedical Sciences Corps (less physician's assistants).

TABLE XXVIII

FULL TIME FEDERAL (CIVILIAN) MEDICAL EMPLOYEES
IN DoD BY GRADE DISTRIBUTION
as of June 1978

GRADE	ARMY	NAVY	AIR FORCE	OTHER DoD	TOTAL DoD
GS-1	0	0	1	0	1
GS-2	41	14	3	1	59
GS-3	513	146	109	1	769
GS-4	2,082	816	589	2	3,489
GS-5	1,935	412	439	5	2,791
GS-6	802	100	189	1	1,092
GS-7	947	283	173	4	1,407
GS-8	288	127	71	6	492
GS-9	1,816	679	883	16	3,394
GS-10	80	26	22	2	130
GS-11	369	95	70	6	540
GS-12	130	35	41	5	211
GS-13	199	83	83	3	368
GS-14	151	33	56	0	240
GS-15	42	10	9	2	63
GS-16	5	0	1	0	6
GS-18	0	1	0	0	1
TOTALS	9,400	2,860	2,739	54	15,053
AVERAGE GRADE	(6.547)	(6.620)	(7.025)	(9.089)	(6.656)

Except for physician's assistants, the rank structures of the three services' medical departments are similar. The Air Force's policy of granting full officer commissions to its PAs, versus Warrant Officer status in the Army and Navy, would tend to indicate a higher overall salary cost in Air Force primary-care settings than in similarily staffed settings in the Army and Navy.

The relative percentage of primary-care physicians in relation to the total physician force is lowest in the Navy. Assuming a similar demand rate for primary-care services as a percentage of total health care demand in each of the three services, the Navy would appear to have a greater need for the services of non-physician providers than the Army or Air Force. However, the data indicates that nurse practitioners in the Navy comprise a lower percentage of its total nursing force than either the Army or Air Force. Similarily, the Navy physician's assistant force is significantly smaller than that of the Army or Air Force.

IV. COST IMPLICATIONS OF EMPLOYING NON-PHYSICIAN HEALTH-CARE PROVIDERS

The purpose of this chapter is to review the literature, both civilian and military, to ascertain what previous author's/ researchers have discovered in the form of cost implications for the utilization of non-physician health-care providers. Once these findings are outlined, as analysis of their implications for the U.S. Military will be discussed.

Throughout the literature, the basic premise of cost savings is that the substitution of less expensive non-physician provider labor for costlier physician time frees the physician to utilize his time in more productive activities, thus reducing costs.

Another prior point to be made is the question of, "cost implications to whom?" Again, throughout the literature this question can apply to two different perspectives: the first, concerns costs to the health-care system as a whole, or to society; the second, is from the perspective of an individual practice, provider group, or other provider entity which is viewed as a potential employer of a non-physician provider, whose goal is to generate income in excess of the costs associated with hiring that non-physician provider.

A. CIVILIAN LITERATURE OVERVIEW

1. Articles Reporting Cost Savings

Within the civilian health care structure, many studies or reports have been published concerning the cost saving implications of utilizing non-physician providers.

One of the earliest articles dealing with this subject (1970) was published by Sidney R. Garfield. /Ref. 43/ Garfield approached this subject from the viewpoint of a Health Maintenance Organization (HMO) and the problem of large numbers of relatively-well and "worried-well" patients flooding the prepaid health care system because the traditional fee-for-service regulator had been removed by the act of a fixed prepayment for comprehensive health care. He contended that the solution was to impose a new regulator to replace the eliminated fee at the point of entry into the system. To this end, he proposed a screening model which would utilize Automated-Multiphasic Health Testing equipment (AMHT) and non-physician providers to separate the well and worried-well patients from the sick and early sick. Patients would then be referred to the appropriate provider for care, thus eliminating inefficient use of physician time.

Working under a U.S. Department of Health, Education, and Welfare contract, Garfield implemented and evaluated his proposed system at the Kaiser-Permanente Medical Center in Oakland, California and almost six years later published his findings. /Ref. 44/ Utilizing nurse practitioners and the AMHT equipment he discovered that 68.4 percent of entering

patients were well and worried well, 3.9 percent were classified as asymptomatic sick, and 27.7 percent were sick. By then referring these groups to the appropriate level of services, physician accessibility to new patients increased 20 times, waiting time for new appointments decreased from six to eight weeks to one to two days, physician time and costs for entry work-up fell by 70 to 80 percent, and total resources used on an annual basis were reduced by $32,550 per 1,000 entrants.

In 1970, the University of Kentucky Medical Center began training Physician Assistants in Diagnostic Radiology. A recently published study has calculated the cost savings implications of employment of the first two classes (12 trainees) of these non-physician providers. /Ref. 45/ Using $60,000 as a yearly net base income of a radiologist, the time the PAs spent in various work activities was calculated by multiplying their percentage of time spent in a work activity by the net base income of an individual who would normally perform that work activity on a full-time basis.

These calculated yearly "earnings" of the PAs averaged $31,164 while their salaries ranged from $18,000 - $25,000. Each PA averaged saving 34 percent of the employing radiologist's time. It should be noted that the "earnings" reported for the second class of PAs were significantly higher than those of the first class (average of $32,634 versus $29,695). However, if this difference is adjusted for inflation at an 8 percent rate, the real increase in "earnings" for the second

class approximates only $563 per PA. In both classes, "earnings" were lowest for those PAs employed in Veterans Administration hospitals.

This study confirms the findings of an earlier effort (1972) dealing with the net income generation potential of nurse practitioners employed in private practice settings, which showed income generation potential over and above salary and overhead (40% of salary) at an annual average of $2,500. /Ref. 46/

An even earlier article (1969), which dealt with only one pediatric nurse practitioner introduced into a two-man pediatric practice, reported that the gross charges for her services were $16,800 annually while her salary was only $7,620--an excess in revenue over salary expense of $9,180.

With this arrangement, the authors reported an increased patient-load, no increase in MD hours used, and no increase in overhead.

In Canada, it was perceived that producing more family physicians would neither alleviate shortages or maldistribution of such doctors. Therefore, government planners and others agreed that nurse practitioners (NPs) would be the most appropriate professional to supplement and augment primary care provided by a physician, or in remote areas, to replace nim.

To evaluate this concept, a reaearch group from McMaster University in Canada developed methods to assess both clinical and financial aspects of such care. Two major project sites were chosen, which consisted of a suburban group

practice and a rural family medical center. Utilizing a random survey methodology in each area, weighted by an average recall time span that respondents could remember medical events, multiplied by an empirical dollar weight per unit of that event, the researchers were able to devise an Utilization and Financial Index (UF - Index). /Ref. 48/ Using the UF - Index the data from the two studies, a randomized controlled trial (suburban area) and a before-and-after study (rural area), was used to outline the financial impacts of introducing nurse practitioners into primary care practices in the two areas.

In the suburban area, family practice physicians in the study were seeing a maximum of patients and had not been accepting any new patients. Nurse practitioners were assigned so as to assume responsibility for one-third of the practice familys. After one year there was a decrease in physician costs of 32%, a decrease in hospitalization costs of 31%, an increase in nurse practitioner and nurse costs of 22%, and an overall UF-Index cost reduction of 11%. /Ref. 49/

In the rural area, the last family doctor had just left when the study group opened a family medicine clinic (FMC) utilizing the nurse practitioner team approach. Patients were free to choose care in the FMC or choose other practices in the surrounding township (TWP). Physician services were reduced by 36% for TWP patients and 47% for FMC patients; nurse practitioner use increased 19% for TWP patients and 522% for FMC patients; there was a 111% increase in use of hospital services by TWP patients with a corresponding 6%

decrease for FMC patients; and the total UF-Index increased 60% for TWP patients while increasing 37% for FMC patients. Although the total UF-index increased for both categories, the FMC group costs were 19% less than those in the TWP group. /Ref. 49/

Of interest is the fact that in the suburban study, physician incomes were reduced by a net $12,000 during the first year while volume of service increased by 9% (24% in the second year). This is assumed to stem from the inability to be reimbursed directly for the services rendered by the nurse practitioners. The study group reimbursed the physicians for this loss to eliminate physician reluctance to delegate tasks to the NPs for financial reasons.

A related Canadian study surveyed 99 nurse practitioners and 79 associated physician employers. While there was an average increase in practice size after employment of the NPs of 14 percent, overall average gross physician income increased by only 2 percent, ranging from a 34 percent increase to a 34 percent decrease. On the other hand, physician net income showed an overall average decrease of 5 percent. Fourteen of the NPs in the study had terminated practice with their original employer. In five of these cases, the physicians involved indicated that their personal loss of income was a determining factor in the termination of the NP. /Ref. 50/

Another recent study, dealing with physician's assistants in an HMO setting, was conducted at the Kaiser - Permanente HMO in Portland, Oregon. /Ref. 51/ This cost-effectiveness

study concentrated on the use of PAs in outpatient clinics where all incoming patients were triaged into three categories: A for patients to be seen by a physician alone; B for patients to be seen by PAs alone; and C for patients to be seen by PAs with consultation by a physician. Taking into account the difference in productivity between PAs and physicians (work week equaling 33.5 hours for PAs and 52.7 hours for physicians, each working 48 weeks a year), and wages ($12.15 hourly for PAs and $19,537 annually, versus $21.63 for physicians, $54,715 annually) the study suggests that physician assistants can save HMOs approximately $20,000 per PA per year. The study suggests that PAs are cost effective even after physician-advisory time and legal restrictions on the type of care PAs are allowed to provide are considered. While directing its efforts to an HMO setting, the study further suggests that if used in the correct proportions to physicians, PAs can improve efficiency in any health care delivery system. /Ref. 52/ (Appendix B summarizes the study's findings.)

Continuing the research begun in Phase I, the authors of the above findings probed further to answer the question, "Could substitution of PAs for physicians be pushed further, with even greater savings, if quality maintenance were the only constraint?" To answer this question they refined their basic model to estimate the potential savings resulting from a maximum-substitution scenario which would use the least-cost combination of MDs and PAs. /Ref. 53/ (A comparison of the two models is presented in Appendix C.)

Savings, as a percentage of ongoing overall costs under the maximum-substitution model increased from 14% in Phase I to a 16% level and suggests that the use of this model might be even more efficient. A notable finding was that in every PA-appropriate category of utilization, a savings resulted from their employment. Despite the fact that in each of these categories total MD and PA provider hours were greater when PAs were used than for an all MD staff, total costs were smaller. Further manipulations of the model revealed that if the PA's work week hours were increased from 33.5 hours to 40 hours, savings would rise to 19% of the all-MD scenario's costs.

Another group of authors devised an experimental linear programming model utilizing 1971 data taken from observations in 14 practices for 1,171 patients. /Ref. 54/ The model was then used to estimate the economic implications of introducing a less costly substitute for the physician into ambulatory care practices (non-referral office visits to physicians). The substitute was a non-physician provider (called a "mid-level health worker" in the study) and the term was inclusive of a: PA, MEDEX; Family or Pediatric NP; Child Health Associate; Health Aide; or a Primex.

The model combined related tasks into 40 possible medical services with 190 alternative techniques of care which could be employed in delivering these services.

Utilization of the model suggested that for practices serving less than 140 patients a week, introduction of a non-physician provider would not be appropriate. However, if a

non-physician provider were introduced into a fully utilized practice of 140 patients per week with current inclusive per patient costs of $10.50, output would expand to 235 patients per week (a 59% increase), while per patient costs would decrease to $7.89 (a 25% decrease). The authors conclude that their analysis suggests that introducing a non-physician provider will reduce the cost of delivering medical services and will increase physician productivity.

Further data on the financial impact of utilization of physician's assistants is found in a study of revenues generated and expenses incurred by 12 PAs in 12 rural private medical practices in New England.[1] /Ref. 55/ All PAs were full-time salaried employees in primary care practice for one or more years. Revenues and expenses generated by the PAs were measured by two methods, and were determined in part by PA - maintained daily logs.

In the first method, revenue is calculated by crediting the PA with the fees paid by patients that he alone treated, plus a proportion of the shared-visit fees in which the PA and the physician both treated the patient. The PAs proportion is based on his treatment time, valued at one-half of the physician's time. The formula is:

$$\text{Total PA Revenues} = \Sigma\ \text{PA Solo Charges} + \Sigma \left(\frac{\text{PA Time}}{\text{PA Time} + 2\ \text{M.D. Time}} \times \text{Shared Charge} \right)$$

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[1] This study shows profitability of employing a PA, not reduced costs.

In the expense portion, the PA is charged with direct expenses plus the proportion of total-practice overhead equal to the proportion of total-practice revenues that he generates.

In the second method, revenue is determined by crediting the PA with his solo charges, but none of the shared-visit charges unless his time input was greater than twice the physician's, in which case he received all the credit. As for expenses, the PA is charged with his direct expenses plus the share of total practice overhead proportionate to his salary as a percentage of total practice salaries.

The first method produced a mean annual revenue of $28,190 against expenses of $15,900. The second method resulted in mean revenues of $30,210 versus mean costs of employment of $20,100. While this indicates that PA employment is profitable to the practice, two of the 12 practices were not. The authors conclude that this is a function of the physician's willingness to delegate tasks and or the personal and professional qualities of the PA.

The Southern California Kaiser Permanente HMO in Inglewood, California was the site of another study which compared the costs and efficiency of a nurse practioner and PA protocol system designed to treat four common acute-illness symptoms, with those of a physician - only nonprotocol system. /Ref. 56/

The study included 472 first-visit patients presenting one of the four complaints, and a subset of 203 of these patients was randomly allocated between the two systems. Costs were based on average provider time spent with a patient times

the average salary of that type of provider, plus average laboratory charges and medication charges generated by a visit. Results showed that the PA - NP system had an average visit cost of $13.39 compared to an average visit of $16.75 for the MD group (a 20% difference). The authors conclude that this PA-NP protocol system saves physician time and reduces costs.

An indepth study to determine the potential need for nurse practitioners and physician's assistants in the state of New Jersey was compiled using 1975 data and published in early 1977. /Ref. 57/ Using a linear programming model and linear regression analysis, the study projected current (1975) and future optimal manpower requirements for primary care office-based physicians, NPs, and PAs, based on the demand for 24 typical services. These 24 services were estimated to account for 72% of all primary care demands.

A survey of randomly selected New Jersey primary care physicians was utilized to determine the appropriate delegation of medical care functions to NPs and PAs. Demand for each medical service was also calculated using the survey data (a total weekly health visit demand of 508,306). Appendix D outlines the results of applying the data to the model. These results indicate that in a least-cost system, current shortages of NP's and PAs exist, with a related surplus of primary care physicians. Optimal manpower requirements are displayed in two forms: MD and NP; and MD, NP, and PA. These displays are required because current New Jersey statutes exclude the use of physician's assistants in that state.

2. Articles Reporting Negative Cost Savings Or Problems

Not all of the findings in the literature have been as positive as those reported in the previous section. When dealing with the cost implications of utilizing PAs or NPs within the civilian sector, some problems are also evident.

For example, one article details the efforts of the Visiting Nurse Association of Burlington, Vermont to establish health services for the unmet health needs of residents of a rural area. /Ref. 58/ The project, which was initiated through a series of grants and state health department support, came close to failing after its first year of operation due to lack of funds to meet operational expenses. The article's author concludes that the major reason for this financial difficulty was the fact that the project's primary health care providers, nurse practitioners, could not properly be reimbursed for their services due to federal and private insurance regulations which required on-site physician supervision of the NPs as a prerequisite for reimbursement. The project has been able to continue through renewed grant support and other fund-raising activities, and in 1976 Blue Shield contracted with the project for a pilot reimbursement plan whereby they would reimburse the project for the NP services received by their policy holders. The article's author estimates that these revenues will meet approximately 14 percent of the project's total expenses.

Another Canadian study took a different approach to deriving cost implications and performed a cost-benefit analysis

of nurse practitioner training. /Ref. 59/ Assuming that the government paid the cost of training the NP, the study concludes that at a 7 percent discount rate, it is economically profitable, within a short time-frame, for the individual and society because the economic benefits (increased income for the individual and value of increased output for society), exceed the economic costs (small miscellaneous instruction expenditures and net income forgone during training for the individual, and cost of training for society). However, the training will be profitable for the government only if the NP remains in the labor force for 30 years. This long time-frame occurs because the economic costs (training costs and taxes foregone during training) are much greater than the economic benefits (increased tax revenues). The study suggests that another economic benefit to the government would be in the form of decreased welfare and unemployment insurance benefits; however, since all the NP trainees in this study had been previously employed, no value was placed on this benefit. It is conceivable that if NP trainees were unemployed prior to commencing training, the value of this particular economic benefit to the government could significantly reduce the pay back period below the 30-year level.

The Diabetes Clinic of a large urban teaching hospital was the site of another study that provides further cost implications of utilizing non-physician providers. /Ref. 60/ This experiment placed individuals with no prior medical experience into a four-week training program to acquire a limited spectrum

of clinical skills. Upon completion of training, these "health assistants" were then employed in the Diabetes Clinic. Using protocols, the health assistants were used to assess the stability of diabetes and hypertension patients who had already been diagnosed and started on a theraputic program by the physician.

This experimental system was then compared on several levels with the traditional system which used nurses (not NPs) and physicians without protocols. While the quality of care and patient satisfaction was comparable in both systems, there accrued only a 20 percent savings in physician time by using the health assistants. These savings in physician time were more than offset due to increased use of laboratory procedures by the health assistants. However, the authors point out that with these increased costs also came increased benefits in the form of more thorough examinations which lead to more significant pathology being noted.

A significant problem occurred in the study because of overlapping roles for the health assistants and the clinic nurses. This overlap created apprehension and inefficiencies. Because the designers of the study were unable to arrive at a cost effective staffing pattern which would permit the clinic to maintain the same number of nurses as before, plus the health assistants. The hospital ultimately chose to eliminate the health assistants and increase the number of nurses by 25 percent. This was done even though the authors show that the total costs of the alternative systems, per patient encounter,

were:

Traditional system - $20.76;

Health Assistant system - $24.67; and the resultant

System utilizing nurses - $25.47.

The costs to the patient are not always decreased when non-physician providers are introduced into a system was also confirmed by a study performed at another large teaching hospital. /Ref. 61/ In this study, nurses were placed in a three-month postgraduate course to gain added diagnostic, therapeutic, and supportive medical care skills. They were then assigned to the hospital's Internal Medicine Clinic where all clinic physicians were encouraged to refer patients to the nurses if they thought a problem appropriate for her skill level. Over a three-month period, 174 patients were referred to the nurses. While scheduled and unscheduled visits to the physicians decreased significantly during this period, because of return visits to the nurses the 174 referred patients actually visited the nurses 403 time. Using costs of $23 per scheduled physician visit, $25 per unscheduled physician visit, and $13 per nurse visit as a base, total visit costs to the patients increased from $53.94 per patient prior to the study to $66.76 per patient during the study. However, as in the previous example /Ref. 59/, there was also an increased benefit in that within the 174 referred patients, the nurses identified 107 new problems which had gone undiscovered by the physicians.

Contrary to the findings of the Canadian study which reported decreased costs for hospitalization after NPs were utilized /Ref. 48/, a study of PAs in a rural area of Appalachia reports that the hospitalization rate increased continuously over the three year study period for those physicians utilizing PAs. /Ref. 62/ The authors cannot explain this statistically significant ($p < .001$) increase, but hypothesize that: prior to use of the PAs the hospitalization rate was too low; the patient mix changed after the PAs were introduced; or that the physicians, because they had more time to spend with patients after the PAs were introduced, were then more apt to uncover something for which hospitalization was indicated.

Shifting northward again, this time to Newfoundland, a study of the effects of introducing a family nurse practitioner into a rural area which had previously been served only by a 40-bed hospital and some public-health nurse visits, reported a decrease in hospital admissions and acute care hospital days. /Ref. 63/ This was in comparison to a control group which also had a decrease in hospital admissions, but at a lesser percentage, and the control group had a significant increase in acute care hospital days.

However, when the total annual cost of health care services was computed, the group seen by the nurse practioner had an increase of 26 percent in costs compared with an increase of only 21 percent in the control group. The authors conclude that in spite of the fact that the NP's salary was lower than that of physicians, her primary-care costs were higher due to

traveling time and because she spent more time with each patient.

One last example of negative cost implications from utilization of a PA is found in the report of a one-year experiment which evaluated a physician's assistant-manned satellite clinic in a rural Oklahoma town of 1,239 people. /Ref. 64/ While the project was termed successful in terms of patient acceptance and quality of care, it was an economic failure. While the PA provided an average of 200 medical services per month (at an average clinic cost of $10.25 per encounter), linear regression analysis showed that the break-even point would require 336 paying encounters per month.

The authors conclude that the critical economic issue was reimbursement, which was hampered by federal and state regulations barring PA reimbursement for services performed when a physician is not on the premises. In fact, the study suggested that those eligible for Medicare coverage did not utilize the clinic in the same proportions as other groups within the community.

B. MILITARY LITERATURE REVIEW

In contrast to the many studies and articles concerned with the cost implications of utilizing non-physician providers in civilian settings, there exists a great paucity of similar data within military health-care settings. If such data does indeed exist, we hypothesize that it is not readily accessible, for our research efforts in this area were most unproductive. The one significant study discovered is a linear

programming staffing model, developed by the Rand Corporation for the U.S. Air Force, /Ref. 65/ and is similar in many respects to the mathematical manpower model developed by Schneider and Foley /Ref. 66/ during the same 1974-1975 time frame.

The primary purpose of the Rand model is to predict the least-cost mix of primary-care providers necessary to staff an Air Force outpatient clinic. Given the amount of time each type of practitioner or practitioner team takes to see a patient, given the patient visits on demand over time, and given the marginal salary cost of each type of practitioner, the cost of a patient visit can be computed. The model then "selects" the least-cost team of practioners to meet patient visit demands.

The model provides two solutions: the first is termed the "perfect triage" solution, and represents an ideal solution which assumes that the diagnosis of the patient is known when he/she arrives; the second solution assumes that the patients diagnosis is unknown for first visits, thus imposing an additional constraint that each provider team sees its "fair-share" of first-visit patients in each diagnostic group, and is termed the "random assignment" solution.

In its study, Rand applied their model to data obtained over a two-week period of observation, 12-25 June, 1974, in the Outpatient clinics at Robins Air Force Base Hospital, Georgia. For the purposes of the study, the overall "outpatient clinic" was considered to consist of only four of a total of 14 clinics which provided primary outpatient care at Robins, but these four clinics comprised 50% of the total

outpatient vistis.

During the period of observation, the principal data gathered consisted of: records of patient visits; diagnosis of each visit; and observations of provider time spent with the patients, disaggregated by diagnosis. These diagnostic groups were then subgrouped on three dimensions: difficulty in making the diagnosis; difficulty in deciding treatment; and difficulty in carrying out the treatment. Each dimension was then rated as "hard", "intermediate", or "easy". All first visit diagnoses were then aggregated into four groups: those which contained any dimension rated as "hard"; those in which all three dimensions were rated as "intermediate"; those rated as "easy", "intermediate", "intermediate"; and those rated as "easy" on all three dimensions.

An index of salary cost for each practitioner/practitioner team was computed by multiplying the amount of time each practitioner spent with the patient and the practitioner's marginal salary cost. The physician's marginal salary cost[1], or the salary needed to recruit large numbers of new physicians was $55,500-- the 1973 average corporate general practitioner salary. The other provider's salary data (nurse-NU), physician assistant (PA), and corpsmen (CP)), was taken from 1973 Regular Military Compensation (RMC) tables. Nurse

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[1] Rand defined the "marginal salary cost" as the cost to the Air Force of procuring an additional health care practitioner of this type. Except for physicians, it was the salary paid at the time of the study.

practitioners were not included, for at the time of the study the Air Force had no school-trained NPs in the field.

Rand assumed that each practitioner would have four hours per day to devote to patient contact, and work five days per week for 48 weeks per year.

Given this scenario and data, Rand used their model (shown in Appendix E) to predict the least-cost provider mix for this military health care activity. The results (shown in Appendix F) reveal that under either the "random assignment" for first visits solution, or the "perfect triage" for first visits solution, total manpower costs could be reduced significantly. The authors conclude that the solution to the physician manning problem is to substitute extender personnel for the general practitioner.

C. FURTHER ANALYSIS BASED ON COST LITERATURE

While the literature previously described is by no means exhaustive, it is representative of methodologies studies have used in their efforts to derive the cost implications associated with expanded use of non-physician health care providers. Of the over 700 non-physician health care provider-related articles and studies collected, read, and indexed in preparing for this study, a subset of 52 were selected as having the most direct impact on the area of cost implications in utilizing non-physician providers.

The review of the literature suggests that the primary elements of cost are: salary; overhead, training; and supervision. Some further amplification and comparisons of these

elements appears appropriate to the analysis.

1. Salary Costs

In the civilian health-care sector a wide range of salaries for PAs has been reported. For example, the results of a 1975 national survey reports an average PA salary of $14,521. /Ref. 67, p. 45/ A survey completed the following year (1976) reported the average PA salary as being $14,800. /Ref. 68/ While this later figure is slightly higher, it is not high enough to account for normal inflationary trends. However, due to possible differences in the populations surveyed, the two figures are of value in presenting an estimated value of average PA salaries for those years. One 1975 study cites a $12,000 average salary, /Ref. 71/ while another study, based on 1975 data in an HMO, included fringe benefits and salary for a total of $19,265. /Ref. 52/

An early (1972) civilian-setting article reported nurse practitioner salaries ranging from $8,600 in a solo fee-for-service practice to $9,400 in a group fee-for-service practice. /Ref. 46/ More recent studies report this figure as $13,087 in 1975 /Ref. 67/ and $13,500 to $14,900 in 1976, depending on whether the NP was credentialed or had a master's degree, in addition. /Ref. 68/

Physicians assistant's salary data in the military varys. While it is the same in the Army and Navy, it is higher in the Air Force. This has occurred because in the last half of 1978, the Air Force began granting full officer commissions to its PAs who had all previously remained in an enlisted

status while the Army and Navy had granted their PAs Warrant Officer status. The Air Force has commissioned most of their PAs to O-1, O-2, or O-3, depending on their experience and educational level.

As of the October 1, 1978 Federal pay raise, Regular Military Compensation (RMC) for an Army or Navy PA is $17,490 (CWO-2, over 10 years service). /Ref. 69/ The comparable salary for an Air Force PA is $19,604 (O-2, over 10 years of service). /Ref. 69/ While one can argue with the rank and longivity chosen to represent the "average" military PA, these figures appear appropriate for an ongoing program with steady input and attrition rates. The "average" military nurse practitioner in this study is defined to be an O-3 with over six years of service. As such, the "average" NP salary is $22,596. /Ref. 69/

The above civilian and military salary data is summarized in Table XXIX. The 1976 civilian average PA and NP salary data reported earlier have been adjusted upward to 1978 estimates using an eight percent inflation factor (1976 PA base salary of $14,800, and a 1976 NP base salary of $14,200 which is the average of the $13,500 and $14,900 figures). /Ref. 68/

From the above data it can be seen that on a purely salary basis, the military is competitive with the civilian sector. Neither the civilian or military salaries include fringe benefits, which have been previously shown to increase total compensation substantially, /Ref. 52/ but it is this author's perception that the military would remain competitive

TABLE XXIX

AVERAGE 1978 NON-PHYSICIAN PROVIDER SALARIES

	Physician's Assistants	Nurse Practitioners
Civilian:	$17,263	$16,523
Air Force:	$19,604	$22,596
Army & Navy	$17,490	$22,596

even if they were. This is based on the general belief that such things as free medical care and commissary/P.X. shopping privileges, while their actual "dollar-value" remains a hotly debated issue within the military community, do provide a substantial amount of fringe benefits to the military population.

While all the previous studies cited show civilian NP salaries lagging behind their PA counterparts, the situation is reversed in the military. Also, the substantial 36 percent salary advantage of the military NP over the civilian NP would seem to indicate a distinct recruiting advantage for the military.

Of final interest is the 12 percent salary advantage that Air Foce PAs have over the Army and Navy PAs. This may reverse the results of a 1976 study which reported that 66 percent of Air Force PAs, who were then forced to remain in enlisted status, would be interested in transferring to the Army because of the Army's policy of awarding Warrant Officer status to their PAs. /Ref. 13/ It may also give the Air Force an advantage in recruiting fully-trained PAs from the civilian sector, as both the Air Force and Navy are currently soliciting such applications.

2. Overhead Costs

Overhead, which is assumed to include such items of cost as space, maintenance, equipment, administration, salaries of supporting personnel, FICA, billing losses, etc., has been a rather nebulous area in the literature, with little

in the way of dollar values having been listed. Also, while its application to cost implications has been previously mentioned, /Ref. 46 and 47/ an exact methodology for its application has not been demonstrated.

What is important, is that one author has demonstrated that in a civilian setting there is very little dissimilarity between the amount of utilities, equipment, and office space utilized by a PA or a physician. /Ref. 52/ This author's practical experience dictates that the same would probably hold true for a military setting.

3. Training Costs

In the civilian sector, especially in the fee-for-service solo or group practice setting, the literature indicates that this cost element is usually irrelevant to the employing physician. While some large health-care institutions and corporations have incurred the expense of training their own non-physician providers, the typical case is to employ an individual who is already fully-trained.

The bulk of these training costs have fallen on the U.S. Government (society). Grants for PA training became available in 1977 through the Health Professions Educational Assistance Act of 1976, (P.L. 94-484). Prior to that time, PA training was supported by contracts with HEW's Bureau of Health Manpower, and from 1974 through 1976, 2,900 PA trainees received this government assistance. /Ref. 70/ Thus, while many studies ignore these costs, they do remain applicable to society as a whole. These training costs vary from study to study, but are substantial as shown in TABLE XXX.

TABLE XXX

NON-PHYSICIAN PROVIDER HISTORICAL TRAINING COSTS

TITLE	YEAR	AVERAGE TRAINING COSTS	(REF)
NP	1971	$ 5,097	(59)
Pediatric NP	1972	$ 3,197	(46)
NP (4 month program)	1975	$ 3,000	(71) P.125
NP (18 month program)	1975	$ 3,500	(71) P.125
Adult Care NP	1976	$ 5,700	(68)
NP	1976	$ 3,475	(67)
Pediatric NP	1976	$ 7,000	(68)
Family Care NP	1976	$10,900	(68)
Master's Degree NP	1976	$14,300	(68)
PA	1975	$11,200	(71) P.125
PA	1975	$12,500	(67)
MEDEX	1976	$10,000	(68)
PA	1976	$15,000	(68)

As shown in Table XXX, PA training programs tend to cost more than do NP programs. One author concludes that this occurs because most NP programs are of a shorter duration than PA programs because NP training can build on a nurse's existing skills. /Ref. 71/

The military services have trained virtually all their own PAs and many of their NPs through their own programs. While no data was discovered in the literature on military NP training costs, one study reported that 1975 training costs per PA ranged from $22,404 for the Army to $31,803 for the Navy. /Ref. 32, p. 34/

This data is substantiated by an Air Force unofficial cost analysis for the physician's assistant training course at the Air Force's School of Health Care Sciences, Sheppard Air Force Base, Texas. /Ref. 72/ This estimate is shown in Appendix G, and for Fiscal year 1979 reveals an estimated cost of $33,061 per Air Force student during the didactic Phase I and a cost of $17,024 for the preceptorship Phase II. This compares with an estimated Phase I cost of $34,414 and Phase II costs of $17,485 for Army National Guard students, which are currently being trained through the Air Force's PA course. All of these estimates are based on a class size of 28 students. The difference is found in the salary differential, as the estimates were based on the typical Air Force student being an E-5, while the typical Army National Guard student is an E-6.

The estimate shows that if the class size were doubled to 56 students, costs in Phase I would drop by only $1,830 per student for both the Air Force and Army National Guard student body, and Phase II costs would remain the same. This occurs because the only cost element to be spread over the larger class size is staff salaries. The large amount of "indirect overhead" ($14,803 per student) does not vary by class size. Unfortunately, the data as obtained does not indicate what elements comprise the "indirect overhead" figure.

These military training cost estimates are all higher than those previously shown for various civilian programs. The reason appears to be that the military estimates are more thorough than the civilian figures and reflect some cost elements that are unique to the military training programs. For example, the military students are still salaried while undergoing instruction, while students in civilian programs typically are not. In the case of the military students, these salaries account for 36 to 40 percent of Phase I costs and 70 to 82 percent of Phase II training costs. While the civilian student is not salaried, the foregone salary represents an opportunity cost to him for undertaking the training. Many of the civilian estimates do not include these opportunity costs, and if they were they would more closely resemble those of the military.

The same situation applies to transportation costs of bringing the student to, and returning him from, the training program. The military includes this cost component while most

civilian programs do not. As before, this represents another element which, if included in civilian estimates, would make their total costs more comparable to military costs.

It remains to establish a base with which the training costs of non-physician providers can be compared. The logical choice is the cost of training a physician, since this is the provider whose patient-care time is targeted for supplementation by the PA and NP.

One article cites 1974 Institute of Medicine figures which show that the average annual cost of education per medical school was $13,000. /Ref. 73/ For four years of medical school this amounts to $52,400 in training costs. However, this total is not complete, for the physician then performs one year of internship (first-year residency) usually with two more years of residency before he enters full medical practice. If you add one more year for his pre-medicine training while in college, his medical education totals eight years.

On the other hand, the PA's training is usually of a two-year duration, with one year of didactic training and one year of preceptorship. Thus, the PA (and the NP) actually begin providing health-care services about six years before the physician.

Although the physician receives a stipend while in residency training and produces some revenue-generating services during this period, they may be offset by the higher wages foregone while participating in the residency training.

At any rate, because the non-physician provider begins producing units of health-care output earlier than the physician, it is possible to estimate the worth of this output. For example, assuming that the non-physician provider's salary equals his worth to the health-care system, and using previously cited figures, one obtains:

1978 estimated PA civilian salary of $17,263 x 6 years = $103.578

However, we must also add the difference in training costs to this value of output. Inflating the 1974 figure of $13,100 for annual MD training costs by 8 percent annually, the estimated 1978 annual MD training cost is $17,822 or $71,288 for four years. Applying the same inflation factor to the highest civilian 1976 PA total training cost ($15,000) results in a 1978 estimated total training cost of $17,496. Thus the difference in total MD and PA training costs is $71,288 - $17,496 or approximately $53,792. When this sum is added to the six-years worth of a non-physician providers output, the total dollar figure difference attributed to training is $157,370. This suggests that the use of a PA instead of an additional physician can result in substantial overall savings to a health care system. While recognizing that a certain number of physicians will be required in any comprehensive health care system, the question that the decision-maker must answer is, "Will the addition of one more physician versus one more PA provide $157,370 of additional benefits?".

4. Supervisory Costs

While the costs of a physician's time spent in supervising a non-physician provider have been alluded to in the literature, clearly over 50 percent have not incorporated this cost component. Of those who have, many have simply glossed over them without citing any dollar figures.

However, one study did look closely at this cost component and discovered that it took about 9.5 percent of a physician's time to supervise one PA. [Ref. 52] This study was based in an HMO in 1975, and given the salary and fringe benefits of a physician as being $53,593, the cost of supervision per PA amounted to $5,091 annually.

Whether in a civilian or military setting, these supervision costs have thus been shown to be substantial, and should be taken into consideration in future studies. Adding non-physician providers to a primary care system also implies that existing physicians' patient-contact times will be reduced.

D. IMPLICATIONS

1. From the Civilian Literature

One of the key issues throughout much of the civilian literature as to the cost-effectiveness of employing a non-physician provider is the issue of reimbursement for their services. The military health care system enjoys a distinct advantage on this issue, since reimbursement for care rendered is not a problem. Because health care within the military health care system is viewed as a fringe benefit, the

beneficiary population is not required to make payment for services received. The military services thus have much more latitude than do civilian health care systems in their utilization of non-physician providers and the degree of physician supervision exercised over them.

In addition, while the Canadian literature /Ref. 49 and 50/ has described instances of reduced physician incomes due to the non-physician provider reimbursement issue, this is not a problem for the U.S. military. For all practical purposes, the military physicians are "salaried" and the addition of non-physician providers to the system has no short-run effect on their incomes under present law and budgeting.

Another key cost issue within the civilian literature is based on the theme of increased "efficiency" by utilizing non-physician providers. However, experience and research have revealed that the operative words within the military are "incrased accessibility". While efficiency and accessibility are not synonomous, it appears that they go hand-in-hand. As has been demonstrated, if a system becomes more efficient by increasing the productivity of its physicians when non-physician providers are added, then its output increases, its workload capacity increases, and it then becomes more accessible to new patients. /Ref. 43, 44, 45, 49, and 54/ It appears, therefore, that there is goal congruity in both the civilian and military sectors on this cost issue, and the successes and problems pertaining to "efficiency" in the civilian literature will have many similar implications for military "accessibility".

For example, the study which indicated that introducing non-physician providers into a fully utilized practice will decrease costs while increasing output /Ref. 54/ has a direct military implication. The much heralded military "physician shortage" and the military's concern over accessibility implies that primary care facilities are currently fully-utilized or even over-utilized. As such, the study's finding of a 59% increase in output after adding non-physician providers implies that the military health care system is a fertile area for their utilization, and at a reduced cost.

One of the problems described in the literature was increased costs associated with physician unwillingness to delegate tasks to the non-physician provider. /Ref. 55/ While the same could hold true for the military services, with increased costs and decreased accessibility, the military environment appears to be more conducive to preventing most of this.

While the civilian fee-for-service physician in private practice might hesitate to delegate tasks to the non-physician provider for financial reasons, such as wanting to personally establish patient-physician rapport in building and maintaining a clientele, the military primary care physician normally has a maximum "clientele" at all times. Also, the military primary care physician's active duty patients are more used to receiving care from non-physicians as a result of operational experience aboard ship or in the "field", where corpsmen or medics are often their primary source of care.

Physician reluctance to delegate tasks based on mistrust or lack of understanding of the non-physician provider's abilities remains a problem in both civilian and military settings and may be best overcome through education and association.

Another problem area described is the political reality of introducing new health practitioners into a system where one group of practitioners views them as a threat to their own employment or status. As shown, this can result in increased costs to the system. /Ref. 60/ This implication also holds for the military, but again there are differences which mitigate much of its impact. For example, due to the nature of an individual's military obligation (length of time one <u>must</u> serve before being eligible for release), few would perceive the addition of a new provider to the system as an immediate threat to his or her continued employment.

On the other hand, the perceived threat to one's "status" or ego may have more implied applicability. The military services are, afterall, by design, rank-concious structures. For the physician this may have little implication, for the non-physician providers may be perceived to be extensions of the physician, subject to his supervision and direction. For the military nurse, however, the issue is a bit more clouded. The issue is not so clear in relation to the PA, who often at the physician's direction must relay the physician's orders for care through a nurse, who (in the Army and Navy) outranks him. /Ref. 74, p. 100/ Thus, this

"political reality" issue appears to have some applicability within the military.

A final area of implications for the military from the civilian literature is the increased costs associated with higher use of laboratory tests [Ref. 60] and increased return visits [Ref. 61] when non-physician providers are utilized. While no comparative literature is available to confirm or deny that these same phenomena exist within the military health care system, the civilian literature implies that they may occur. Although the civilian literature is often contradictory, such as the study that found that NPs used <u>less</u> laboratory tests than physicians but prescribed more medications [Ref. 56], the military health care decision-makers must be aware that some systemic cost patterns may change when non-physician providers are utilized.

These changes may imply a need for the reordering of ancillary manpower, such as in the pharmacy and laboratory, and increased target amounts within the budgetary process. Unfortunately, any increase in the costs of these ancillary services may not be offset at the individual facility level. This occurs because the largest cost reduction factor in utilizing non-physician providers lies within the realm of reduced manpower costs by adding these providers instead of more physicians. At present, any manpower savings realized do not accrue to the individual facility, but to the U. S. Government or society as a whole.

While it may appear to be a case of suboptimization by suggesting that they do accrue to the individual military health care facility, it may be a negative incentive to the local facility commander to utilize non-physician providers if he must bear any increased costs of their utilization without reaping any of the financial rewards. Increasing the local commander's cost reducing incentives was suggested in the 1975 Military Health Care Study through its recommendations for capitation budgeting and decentralized control to regional authorities. [Ref. 1] Shifting control of the cost containment incentive was also considered "essential" in a study prepared for the Navy Surgeon General in 1977. [Ref. 75] Although a pilot project of capitation budgeting at selected military health care facilities has been recently completed, the delegation of authority over manpower costs to the facility commander has not occurred, nor is it envisioned in the near future.

What facility commanders should not overlook, however, is the fact that although the literature indicates some increased costs associated with non-physician provider utilization, they also indicate that these costs have been associated with increased benefits. These benfits have been in the form of increased quality of care through discovery of previously undetected medical problems. Military decision makers and future studies should attempt to quantify and evaluate these tradeoffs.

2. From the Military Literature

a. The Rand Model

As previously stated, the only significant study dealing with the cost implications of utilizing non-physician providers in a military setting was the Rand Corporation study /Ref. 65/, whose mathematical model is shown in Appendix E. In analyzing this study, the first step was to determine if, given the model and the data in the study, Rand's results could be reproduced. After repeated iterations of the model the answer was unclear.

There was no problem in arriving at the same salary cost indexes given in the study by simply multiplying the provider's salary by the number of minutes he/she averaged in seeing a patient in a certain diagnostic class, then moving the decimal five places to the left and rounding to the nearest hundredth. When two providers were on a team, each provider's time was multiplied by his salary, then the two were added to form a composity salary index.

Based on these salary cost indexes for each group of diagnoses, Rand selected the least cost provider team. The lowest cost team was selected for the situation when an MD was required, when an MD was not required, and (for first visits only) under the same two situations when the nurse (NU) plus corpsman (CP) and corpsman only (CP) teams were deleted. The NU + CP and CP teams were deleted under one solution to each of Rand's alternative staffing patterns in recognition of the fact that some decision-makers may believe that the

training of the corpsman and the nurse are inadequate to treat first-visit patients with only minimal MD supervision. There was no difficulty in arriving at the same least-cost teams for the two alternative methods of organizations, as shown in the study. (Rand's least-cost provider teams are shown in Appendix H.)

Once the least-cost teams were known, the data in the study concerning average provider time in seeing a patient and the number of patients seen in the various diagnostic groups was used to compute the optimal provider mix for each alternative organization (random assignment or perfect triage for first visits).

This was done by computing total provider time required, for each alternative. This was accomplished by multiplying the least-cost provider teams' patient treatment time in each diagnostic group by the number of patients actually seen in that diagnostic group; both when an MD is normally required and when he is not. Total provider time for each type of provider is then summed across all diagnostic groups in the first-visit category, plus return visits and physical exams.

Once each provider's total time required under each alternative organization is obtained it is multiplied by 26 because the study period was of only two weeks duration and multiplying by 26 puts it in terms of annual requirements. This product is then multiplied by two, for reasons that remain unclear to the present analyst. It is likely because

Rand used data on 1,018 patients in their study, but state early-on that 2,404 patients visited the "outpatient clinic" during the two weeks of the study. While the 1,018 patients on which data was available are roughly "half" of total patients actually seen, the factor of two seems somewhat imprecise.

This product is then divided by 57,600, which is the number of minutes each provider sees patients during a year: 4 hrs/day x 60 min. = 240 min/day x 5 days/wk = 1,200 min/wk x 48 working weeks/yr = 57,600 min/yr. Dividing by this number of each type results in the total number of each type of provider required to staff the outpatient clinic.

However, when the results of our analysis are compared with Rand's there appears to be some disparity, as shown in Table XXXI. The explanation for this disparity in the results is not readily explained. It first appeared that possibly Rand used some other unstated adjustment factor in their calculations. However, after numerous adjustments and model manipulations it appears that the disparity under alternative #1 (Random Assignment for first visits) can be explained by the computation of provider time associated with return visits. Rand's study utilized two tables for return visits: one for return visits when an MD is usually required; another for return visits when an MD is usually not required. However, in the table associated with return visits when an MD is usually required they computed two salary cost indexes: one for situations without MD referral; another for the situation when MD referral is needed.

TABLE XXXI

COMPARISON OF THE RAND ANALYSIS AND REPLICATIVE ANALYSIS

Rand's Results

	ALTERNATIVE 1		ALTERNATIVE 2	
	Random Assignment for First Visit		Perfect Triage for First Visit	
	Solution #1 All Teams Possible	Solution #2 NU + CP, CP Teams Deleted*	Solution #3 All Teams Possible	Solution #4 NU + CP, CP Teams Deleted*
# of MDs	2.7	2.7	2.2	2.2
# of PAs	0	4.4	.3	3.3
# of NUs	1.9	.8	1.4	.8
# of CPs	3.8	1.2	4.1	1.8
Salary Cost 1 year	$222,000	$230,000	$192,000	$199,000

Results of Replicative Analysis

# of MDs	2.9	2.9	2.2	2.2
# of PAs	0	4.0	.6	2.9
# of NUs	1.8	.8	1.2	.8
# of CPs	3.7	1.1	3.4	1.6
Salary Cost 1 year	$230,400	$238,500	$186,060	$190,490

* Deleted for first visits only.

In the present analysis it was assumed that if, as the table's title indicates, an MD is usually required to see these patients, then the least cost team which includes an MD should see all of the 160 patients which were in this category. In fact, Rand indicates the same thing as shown in their least-cost team selection of an MD + CP in Appendix G. Yet, if the MD + CP team's are applied only to the 136 patients who actually saw a team which included an MD, and the remaining 24 patients are applied to the least-cost team which does not include an MD (a corpsman), Rand's results are almost duplicated, as indicates in Table XXXII. Under solution #1, only the number of nurses is at odds with Rand's results (1.8 versus 1.9) and this may be explained by slight differences in rounding figures. Under solution #2, only the number of PAs remains different (4.0 versus 4.4). No ready explanation is available for this difference, and numerous iterations continue to show the figure as 4.0.

At any rate, to apply the data as Rand did appears to be erroneous for if patients in this return visit classification do normally require to be seen by an MD, then all 160 should be applied against the least-cost team which contains an MD. To not do so understates the MD requirements, understates costs, and may affect the quality of care rendered.

No explanation can be offered for the differences between this analysis and Rand's figures under alternative #2. It can only be concluded that, given the model and the data in the study, our methodology and figures appear sound.

TABLE XXXII

RESULTS OF FURTHER ANALYSIS TO REPLICATE RAND'S RESULTS

Alternative I

Random Assignment for First Visits		
	Solution #1. All Teams Possible	Solution #2 NU + CP CP Teams Deleted for First Visits Only
# of MDs	2.7	2.7
# of PAs	0	4.0
# of NUs	1.8	.8
# of CPs	3.8	1.2
SALARY COST FOR 1 YEAR	$220,350	$228,450

b. The Rand Model, Updated

The second question confronting this analysis was, "What happens if the salary data in the model is updated to current (1978) levels?" Utilizing the same methodology and reasoning as before, a second iteration of the Rand model was completed after adjusting the salary data to current levels. A problem occurred in obtaining the 1978 corporate general practitioner average salary, as this data was not yet publicly available. For this reason, the original 1973 physician salary was adjusted by the annual Consumer Price Index (CPI) percentage increase for physician's fees from 1973 to August, 1978. /Ref. 76/ These calculations give an estimated 1978 average salary for a corporate general practitioner of $86,030.

The other practitioner salary data was obtained by using the 1978 Regular Military Compensation (RMC) data published after the October 1, 1978 federal pay-raise. /Ref. 69/ However, the recent policy of the Air Force to grant full officer commissions to their PAs (discussed previously) has resulted in two baseline figures for military PAs" Air Force -- $19,604 for an O-2 over 10 years service (with more than 4 years enlisted service); and Army and Navy -- $17,390 for a CWO2 over 10 years service. The O-3 over 6 years service figure of $22,596 was used for the nurse, and the corpsman's salary was $13,835 for an E-6 over 10 years Service.

When the provider teams' salary index was updated using these new salary figures it was discovered that the least-cost teams remained exactly the same as in the original version of Rand's study. Since the least-cost teams remained the same, and since the original provider - time and patient diagnostic data were used in the updated version, the number of each type of practitioner required also remained the same. The only changes that occurred were found in total salary costs, as displayed in Table XXXIII.

The differences in total costs between the Air Force and Army/Navy results from the differing PA salaries. In sum, the Air Force policy of commissioning their PAs to full officer status has increased their least-cost total health care costs, depending on the alternative and solution selected, from $0 to $6,131 per activity.

c. Implications for Navy-wide Staffing

Making the heroic assumption that the data obtained from Robins Air Force Base is typical of that encountered by the entire CONUS U. S. Navy Medical Department, what staffing implications does this study have for the Navy?

Using data obtained from a previous Naval Postgraduate School thesis, entitled, "Estimation of Average Cost Per Beneficiary in the Military Health Service System", by William Brown and Michael Roman and published in March, 1978, [Ref. 77] the estimated beneficiary population supported by Robins Air Force Base Hospital is 24,242. The same source lists the estimated total population supported by the U. S.

TABLE XXXIII

ANALYTICAL VERSION OF RAND'S ORIGINAL MODEL

	ALTERNATIVE 1		ALTERNATIVE 2	
	Random Assignment for First Visit		Perfect Triage for First Visit	
	Solution #1 All Teams Possible	Solution #2 NU + CP, CP Teams Deleted for First Visits Only	Solution #3 All Teams Possible	Solution #4 NU + CP, CP Teams Deleted for First Visits Only
# of MDs	2.9	2.9	2.2	2.2
# of PAs	0	4.0	.6	2.9
# of NUs	1.8	.8	1.2	.8
# of CPs	3.7	1.1	3.4	1.6
Salary Cost 1 Year	$230,400	$238,500	$186,060	$190.490

1978 Updated Version

# of MDs	2.9	2.9	2.2	2.2
# of PAs	0	4.0	.6	2.9
# of NUs	1.8	.8	1.2	.8
# of CPs	3.7	1.1	3.4	1.6

		USAF	USA & USN	USAF	USA & USN	USAF	USA & USN
Salary Cost 1 Year	$341,263	406,112	397,565	275,116	273,848	286,265	280,134

Navy as 1,885,054 beneficiaries.

Dividing the total Navy-supported beneficiary population by Robins total beneficiary population supported, (1,885,054 ÷ 24,242) gives us a factor of 77.56. In other words the Navy needs 77.76 times more providers than Robins AFB to provide the same level of outpatient care to one-half the beneficiaries it supports. Applying this factor to the least-cost number of providers resulting from both of my iterations of the Rand model (the resultant provider numbers were identical) results in a projected number and mix of providers as indicated in Table XXXIV.

The results indicate that if Alternative 1, Solution #2, is selected the current total Navy PA force of 238 PAs will be inadequate to meet the least-cost staffing organization for outpatient services.

d. Evaluation of the Alternative Organizations

(1) Effectiveness

The assumption of the model that the quality of care provided by each practitioner or practitioner team will be the same appears to be overly optomistic and simplistic. From prior experience, not all practitioners of the same type have the same skill level in diagnosing and treating patients, even when they have had the same level of training. This might be explained by differences in basic learning ability, interest levels, and the amount of time one spends independently to gain a higher level of skill or knowledge. The model not only assumes away these differences within members

of a provider type, it also assumes away quality differences between groups of different types of providers. Although the model does account for the fact that providers with different skill levels will use different amounts of time to see a patient, it remains questionable whether or not using more time to see the patient will result in an equal level of quality of care. The pros and cons of this assumption should be brought to the attention of the decision-maker.

(2) Costs

Since the model is a staffing model, the only costs considered are those of the provider's salaries. It would appear that the model assumes that the marginal salary cost of each practitioner includes the total annual cost of bringing aboard a fully-trained individual. However, other costs associated with the practitioner are not considered; such as recruiting costs and training costs. While one might argue that recruiting costs are basically the same for each of the four practitioner types considered, and are hence irrelevant, the same argument does not hold for training costs.

With the expiration of the military training programs for enlisted personnel to become nurses, and the expiration of the nursing scholarship programs, it would appear that only in the case of the nurse does the military recruit a fully-trained practitioner. Virtually all of the military PAs have been trained from within the military services, at military expense. All the military corpsmen complete some form of military medical training. Also, since the end

TABLE XXXIV

NAVY STAFFING IMPLICATIONS FROM THE RAND MODEL

	ALTERNATIVE 1		ALTERNATIVE 2	
	Random Assignment for First Visit		Perfect Triage for First Visit	
	Solution #1 All Teams Possible	Solution #2 NU + CP, CP Teams Deleted for first visit only	Solution #3 All Teams Possible	Solution #4 NU + CP, CP Teams Deleted for first visit only
# of MDs	2.9X77.76= 225.5	2.9X77.76= 225.5	2.2X77.76= 171.1	2.2X77.76= 171.1
# of PAs	0X77.76=0	4X77.76=311	.6X77.76= 46.7	2.9X77.76= 225.5
# of NUs	1.8X77.76= 140	.8X77.76= 62.2	1.2X77.76= 93.3	.8X77.76= 62.2
# of CPs	3.7X77.76= 287.7	1.1X77.76= 85.5	3.4X77.76= 264.4	1.6X77.76= 124.4

of the draft, the military services have had to rely more on the physician scholarship programs to obtain physicians, and have also now resorted to their own medical school -- the Uniformed Services University of Health Sciences -- to obtain new physicians.

Were these training costs added to the marginal salary costs over the practitioner's obligated service, the least-cost provider team might change in some instances. Again, the decision-maker should view this as an area for further investigation.

In analyzing the two alternatives of the model, it appears that alternative #2, Perfect Triage for First Visit, will always have the two lowest-cost solutions than Alternative #1, Random Assignment for First Visit. However, Alternative #2 disregards the cost of performing the triage. While it is unknown how much it would cost to perform the triage, the most an activity would be willing to pay for this service is the difference in total costs between comparable solutions under either alternative. For example, under the iteration of Rand's original data, when all teams are possible, total cost under Alternative #1 is $230,400 versus $186,060 for Alternative #2. The difference of $44,340 is the maximum you would pay for the triage capability. When all teams are possible in the updated (1978) iteration, this difference becomes $66,147 for the Air Force and $67,415 for the Army and Navy. When you delete the NU + CP teams for first visits only, the difference jumps to $119,847 for the Air Force and $117,522 for the Army and Navy.

Another interesting phenomenon is the fact that our least-cost provider teams and our total number of providers did not change when we updated the model to 1978 salary data. The reason for this is that there is a built-in lower limit in the data on physician manpower which cannot be violated. This occurs because a certain number of return visits, first visits, and physical exams must, by virtue of their medical needs, be seen by a physician.

Our original iteration of the Rand model had already reached this lower limit, and raising the physician's salary in the updated version had no effect on this minimum amount of physician providers. In fact, holding all other salaries and all provider times constant, one could raise the physician salary as high as desired and still obtain the same results.

On the other hand, what happens if physician salaries are lowered? For this iteration of the model, we updated the salaries of all providers to 1978 RMC levels, including the physician's. For the physician salary, we used the base amount of $25,702 for an O-4 over 10 years (for pay purposes), and then added on the $9,000 minimum Variable Incentive Pay (VIP) and $350 per month Professional Pay. This resulted in an estimated average 1978 military salary of $38,902.

The results of this iteration of the model, as compared with the 1978 iteration which used an estimated civilian salary, are shown in Table XXXV.

TABLE XXXV

ANALYTICAL VERSION OF THE RAND MODEL
UTILIZING 1978 SALARY DATA

1978 Version, With Civilian MD Salary

	Random Assignment For First Visits			Perfect Triage For First Visits			
	Solution #1 All Teams Possible	Solution #2 NU + CP, CP Teams Deleted For First Visit Only		Solution #3 All Teams Possible		Solution #4 NU + CP, CP Teams Deleted For First Visit Only	
# of MDs	2.9	2.9		2.2		2.2	
# of PAs	0	4.0		.6		2.9	
# of NUs	1.8	.8		1.2		.8	
# of CPs	3.7	1.1		3.4		1.6	
Salary Cost 1 Year	USAF, USA AND USN $341,263	USAF 406,112	USA&USN 397,656	USAF 275,116	USA&USN 273,848	USAF 286,265	USA&USN 280,134

1978 Version, With Military MD Salary

	Solution #1	Solution #2	Solution #3	Solution #4	
# of MDs	2.9	5.1	2.4	2.4	
# of PAs	0	0	0	2.3	
# of NUs	1.8	.8	1.2	.8	
# of CPs	3.7	1.1	3.4	1.6	
Salary Cost 1 Year	USAF, USA & USN $204,679	USAF, USA & USN $231,696	USAF, USA & USN $172,225	USAF $178,667	USA & USN $173,805

As shown in Table XXXIV, as physician salaries are reduced to current military levels, the physician cost index drops, and they tend to be utilized much more as the least-cost provider in certain instances.

This has important implications for the decision-maker. If the worth of the military physician is viewed as the amount of his military salary, instead of the marginal salary (civilian salary) which you would have to pay to recruit large numbers of additional MDs, you will want to utilize even more physicians in the provision of outpatient care. This in turn exacerbates an already untenable situation, considering the current military physician shortage. Under either alternative, you will also use less of the PA, which you have trained so as to alleviate this physician shortage. In other words, given the assumed reliability of the Rand model to predict least-cost staffing patterns, the decision-maker must use the marginal physician salary (civilian) in order to alleviate a physician shortage in the provision of outpatient care.

An even greater implication of this model is that the total number of physicians required in the military may be reduced by replacing them with PAs and other practitioners. The resultant savings from reducing requirements for MDs might then be applied towards raising physician salaries to be more competitive with those in the civilian marketplace. If this were done, we might be assured a steady supply of physicians to meet these reduced requirements.

Thus, it appears that the iteration of the model that is most applicable is the 1978 updated version, (Table XXXIV), which uses civilian MD salary data. The implications for the Navy in using this model, as shown previously, result in a total number of various practitioners under the different versions of the alternatives. The decision-maker must remember that the data on which the provider requirements are based, come from only one-half of the patient visits to Robins Air Force Base. Additional providers will be required to see the other half of the outpatient workload.

For the Navy, this implies that depending on the alternative selected, you may have a shortage of PAs. For example, under alternative #1, Solution #2, the application of the model's results to the Navy's total beneficiary population predicts a requirement of 311 PAs. Again, remember that this is only for one-half of all Navy outpatient visits. If PAs are to be utilized in those clinics which see the other one-half of all outpatient visits, the total PA requirement will be even higher. As was shown in Table XI, the current total of PAs in the entire U. S. Navy is 238. If either Alternative #1, Solution #2, or Alternative #2, Solution #4, is selected, the Navy probably will not have enough PAs to meet the requirements for seeing all appropriate outpatient visits.

As stated earlier, the Rand Model did not incorporate nurse practitioners into their study as they were not part of the provider mix at Robbins Air Force Base at the time of the study. This omission leaves uanaswered

questions concerning the NP's substitutability for PAs and the possible effect the NP would have on the least-cost provider teams selected under the alternative forms of organization. The author can only hypothesize answers to these questions based on the literature reviewed and the data presented in this study.

As to the substitutability issue, since this portion of the overall study has not addressed specific task performance or capabilities of the NP or PA, the answer is unclear. The literature is quite specific that NPs do not consider themselves to be PAs or physician extenders. However, this author perceives this as primarily a desire by NPs not to be placed into the same "titular category" with PAs, and to retain their own autonomy apart from the physician. With respect to professional primary-care abilities, it is the author's perception that the family practice/adult care NP could perform the same range of tasks as the PA, and vice versa. While the true answer remains a subject for further research and future efforts, this assumption would permit the substitution of some NPs with PAs.

This professional substitutability assumption allows progression to the second question concerning the effect on the least-cost provider teams. With respect to the literature, it has been indicated that NPs take more time per patient than do physicians. It is assumed that this time factor may exceed that of the PA, too. This assumption is based on the different approach to treatment by the NP; an approach which

tends to encompass the whole patient and his environment rather than an isolated organ or affected area. When this assumed longer patient treatment time of the NP is multiplied by the NP's salary, which is higher than that of the PA (in the Army and Navy), it would seem to indicate a higher salary cost index than that of the PA. Thus, the NP, if substituted for the PA in the Rand Model or introduced as an additional provider, may not appear as the least-cost provider choice in Army and Navy settings under various alternatives. In Air Force settings, due to comparable rank and salary structures, the same hypothesis may not hold as the NP may be a close or near least-cost substitute for the PA.

These questions remain as areas for further research and study. The Rand Study was an interim report and future iterations and refinements of the model should include the NP as an additional provider choice so as to provide further insight into the questions posed in this study.

V. SUMMARY AND CONCLUSIONS

A. SUMMARY

As outlined in Chapter I, this study is the first of two dealing with the implications for the Military Health Care System associated with utilizing non-physician providers. The major emphasis of this portion deals with the cost implications associated with their utilization, while the succeeding portion will address staffing/utilization implications. Chapter I also sets definitions of certain terms used in this study.

The American concept of utilizing physician's assistants in the provision of primary-care began in the civilian medical community in the early 1960's. The first formal PA training program began at Duke University in 1965 and has been referred to as the "university model" of training PAs. The second major model for PA training programs has been the MEDEX Program, first established at the University of Washington in late 1968.

The reasons for originally implementing the PA concept in the civilian health care community were: increasing specialization of physicians with resultant shortages in primary-care areas; geographical maldistribution of physicians with shortages in rural areas; inability of medical schools to produce enough new physicians to meet demand; and Medicare-Medicaid legislation costs. Federal funding for PA training programs and grants to trainees also aided in the rapid development of the PA concept which was viewed as an adjunct to, not a substitute for, physician manpower.

The Army, Navy, and Air Force all developed their own PA training programs in the early 1970's as a response to the end of the "doctor draft" and the resultant loss of their main source of primary-care physicians. Each of the military PA training programs have been based on the "university model" of PA training. The Army and Air Force have trained enough PAs to meet their originally envisioned end-strengths, while the Navy, citing "budgetary constraints", has not. The Army PA training program is currently inactive, and the Air Force program is now winding-down with no new student input. The Navy, on the other hand, is currently developing two new PA training sites whose programs will be based on the "MEDEX model" and will begin student input during 1979.

Navy and Army PAs are commissioned as Warrant Officers, while the Air Force PAs were recently granted full officer commissions. Both the Navy and Air Force are currently soliciting PA applicants from the civilian community.

The Navy and Air Force have kept with the original concept of utilizing PAs as adjuncts to existing physician manpower, while the Army has used the PA as a substitute for the physician within combat units.

Although the concept of a nurse practitioner existed within the civilian health care community before the PA concept, the first formal NP training program wasn't implemented until 1965 at the University of Colorado, the same year that saw the birth of the first formal PA training program. The same reasons that gave rise to the PA concept also were instrumental in the

development and growth of the NP concept.

The primary source of NPs has been short-term courses of three to 14 months duration which lead to a NP certificate, followed by master's degree programs of nine to 24 months in length. Development of these programs has been encouraged by federal funding.

While the development of PA programs, program certification, and credentialing of the PA graduates has been carefully monitored and controlled by the AMA, the nurse practitioners have resisted similar physician influence over their development. Today's civilian health care environment is characterized by role conflict between the physician and the NP. Despite this conflict the general NP concept has grown and prospered. It appears to have stabilized in 1977, with 130 certificate and 45 master's programs in existence. There are currently over 12,000 formally trained NPs in America.

The end of the "doctor draft" was not the original motivating factor for adding NPs to the military health care team, as it was for the PA, although this factor later encouraged the growth of the NP concept within the military. Instead, the initial impetus for utilizing NPs came from perceived needs for their services in specific health care areas.

The first NP training programs in the Air Force and Army were characterized by formally sponsored courses, while development in the Navy came from a "grass-roots" approach of informal on-the-job training programs at the individual hospital level. These Navy courses were later formalized, too.

While each of the services have trained NPs at various civilian institutions, the Army and Air Force programs have evolved to basic certificate programs conducted within their own service facilities, with no affiliation with civilian educational institutions. The Navy NP training remains affiliated with the University of California at San Diego, and is also a certificate program.

Although the primary concern of this study is with non-physician providers, data was presented on the entire health care personnel composition of the Military Health Care System because of the dynamic interactions between all provider-types when non-physician providers are added to a health care system. Specifically, the current total active duty military physician force consists of 10,761 physicians for 11,841 authorized billets, resulting in a nine percent overall physician "shortage". Of the total physician force, 3,444 are serving in the Navy, 4,167 in the Army, and 3,150 in the Air Force. Of these totals, the Navy's is comprised of 31.28 percent primary-care physicians, while the Army and Air Force totals include 51.01 percent and 43.25 percent primary-care physicians, respectively.

The total active duty military nursing force is composed of 10,207 officers. Of this total 2,571 are serving in the Navy, 3,877 in the Army, and 3,759 in the Air Force. These totals include the 619 military nurse practitioners: 83 in the Navy, 150 in the Army, and 386 in the Air Force.

There are 328 physician's assistants serving on active duty in the Navy and 366 in the Air Force. Both of these military services are utilizing their PAs in the "traditional" health care settings within hospitals, medical centers, and clinics. On the other hand, the Army is utilizing over 70 percent of its 414 PAs within combat units.

The Navy Medical Service Corps consists of 1,773 officers. Of this total, 55 percent are serving in allied health specialties and 45 percent perform health care administration functions. The Army Medical Service Corps is comprised of 4,639 officers. While less than two percent of these officers are actually classified as "health care administrators", approximately 66 percent are actually performing health care administration duties, and the reamining 34 percent are serving in allied health specialties. In addition, the Army has a 454--member Medical Specialty Corps composed of Occupational and Physical Therapists and Dieticians. Were these additional allied health specialists added to those within the Army Medical Service Corps (as they are in the Navy), the actual percentages of administrators and allied health specialists would become 60 percent and 40 percent, respectively. The entire 1,025 officers of the Air Force Medical Service Corps are health services administrators. All Air Force allied health specialists are members of the Biomedical Sciences Corps, whose current strength is 1,545 officers. Combining the membership of these two corps presents a total whose composition is approximately 40 percent health care administrators and 60 percent allied health specialists.

The enlisted personnel within the Military Health Care System provide vital ancillary health care services and they comprise the largest single cadre of health care personnel in the system. The Navy's Hospital Corps is comprised of 22,762 men and women who are engaged in various medical activities. Approximately 54 percent of this force is composed of "general duty" corpsmen, while the remaining 49 percent span 39 separate specialty areas. The Army has 37,705 enlisted health care personnel, 33,992 of whom serve in 27 medical specialties, the largest of which (48 percent) is the "medical specialist" designator and equates to the Navy's "general duty" title. Air Force enlisted health care personnel comprise a force of 20,451 personnel, of which 951 are "veterinary specialists". The remaining force spans 29 separate enlisted medical specialties.

In addition to the active duty officers and enlisted personnel within the Military Health Care System, the Department of Defense employs 15,053 full-time civilian "white-collar" health care employees. Of this total, 14,999 are directly employed by the military services, and only 54 are employed within other DoD agencies. The Army is the largest employer of health care civilian personnel with 9,400 employees. The Navy and Air Force employ 2,860 and 2,739, respectively. The military services employ 749 full-time civilian physicians, 12 physician's assistants, 4 dentists, 20 hospital administrators, 3,705 nurses, and the remaining 10,509 personnel are employed in 35 other medical, nursing, and dental specialty areas.

On the positive side, the literature indicates that the utilization of non-physician providers can reduce costs to the individual patient; that the revenues generated by their utilization exceed their expenses; that physician manpower costs are reduced; that system efficiency is enhanced; that a system's capacity is increased which then increases patient accessibility; that total physician manpower requirements are reduced; and that overall system costs are reduced.

On the negative side, the literature indicates that: current federal and third-party payer reimbursement regulations have reduced some employing physician's incomes and limited the utilization of non-physician providers; utilization of non-physician providers in practices seeing less than 140 patients per week may be economically unprofitable; some states restrict their utilization; non-physician providers may be perceived as threatening to the job stability of other health care workers; patient costs may rise due to the discovery of additional health problems by non-physician providers; the non-physician providers spend more time per patient than do physicians; and there is conflicting findings as to whether or not the utilization of non-physician providers increases or decreases the amount of ancillary services and hospital admissions utilized.

The literature suggests that the primary cost elements associated with utilizing non-physician providers are: salary; overhead; training; and supervision. The average 1978 PA salaries are: civilian--$17,263; Air Force--$19,604; and Navy and Army--$17,490. Average NP salaries for 1978 are:

civilian--$16,563; and all military services--$22,596. Overhead costs are frequently omitted in studies within the literature, but have been shown to be similar for both non-physician providers and physicians. The bulk of non-physician provider training costs have fallen on the U. S. government through grants and subsidies. Training costs vary widely, depending on the program, and PA training costs tend to be higher than NP training costs. Training costs between civilian and military programs lack comparability due to a dissimilarity in the cost elements included. Superivision costs of non-physician providers have not been included in over 50 percent of the literature addressing cost implications, yet some studies have shown them to be substantial.

B. CONCLUSIONS

This study supports the following conclusions:

1. Although the Navy is the only military service which has not trained enough physician's assistants to meet its original goal, it may have the greatest need for non-physician providers as it has the lowest percentage of primary-care physicians within its total physician force, as compared with the Army and Air Force.

2. The military services enjoy an advantage over civilian health care organizations with respect to reimbursement for the services of non-physician providers.

3. Patient accessibility into a health care system is increased due to increases in physician productivity, when non-physician providers are utilized.

4. Physician reluctance to delegate tasks to non-physician providers should be a lesser problem in military settings than in civilian settings.

5. Non-physician providers are less likely to be perceived as "threatening" to the job security of other health care workers within military (versus civilian) settings, although perceived threats to other health workers' "status" remains a potential area of conflict.

6. Increases in facility-level costs incurred by utilizing non-physician providers are more than offset by savings in total manpower salaries; however, under the current military structure and law these savings don't accrue to the individual medical facility. This creates a negative incentive for the facility commander to utilize non-physician providers.

7. Based on the Rand Corporation model, primary-care physician requirements can be dramatically reduced by utilizing non-physician providers, and although the number of other types of health care personnel will increase, substantial decreases in overall salary costs will be obtained. However, applying this model to the Navy's patient population predicts that the total Navy non-physician provider force may be too small to meet the model's predicted staffing requirements under various alternatives.

Given these conclusions, further research appears to be indicated in the area of NP and PA task analysis. Such analysis, directed toward tasks which the PA and NP are trained

to perform, may provide enlightenment as to the substitutability of one non-physician provider for the other. This information would allow the decision-maker to better decide as to the provider mix to be utilized in a given situation and the cost implications attendant to those decisions.

In addition, future least-cost staffing models such as the Rand study should include NPs in their overall provider-team options. Without their inclusion the decision-maker has only partial information on which to base his staffing decisions, which may ultimately result in suboptimal choices in relation to total staffing costs.

APPENDIX A

The George Washington University
School of Medicine and Health Sciences
Proposed Program to Train
Physician's Assistants
for the
United States Navy

I. INTRODUCTION

I have at the request of our Navy representative put together the following document which proposes to train Physician's Assistants for the United States Navy.

These materials are based on the premise that the Advanced Hospital Corpsman after completion of the Class C (8425) School and one year of independent duty is an ideal candidate to receive the additional training and education needed to prepare him for practice as a physician's assistant. This preparation includes additional academic, as well as clinical, experiences in order that he may be eligible for State as well as National certification.

It is our contention that this additional training can be offered through our already established off-campus affiliation with the Navy. We would need to establish this program in close conjunction with and under the auspices of our Department of Health Care Sciences which houses our on-campus physician's assistant program.

SOURCE: Enclosure to letter from Jarrett M. Wise, Director for Allied Health, The George Washington University Medical Center, to LT Brian Colfack, MSC, USN, Dated 1 September 1978.

The first step in constructing a program which is academically sound as well as cost effective is to determine how much of the current Advanced Hospital Corps School curriculum could be used in training a physician's assistant. This must be done keeping in mind that a joint physician's assistant program would need to be eligible for accreditation by the American Medical Association.

II. CURRICULUM COMPARISON

To determine what additional training the Advanced Hospital Corpsman would need in order to practice as a physician's assistant we have as a first stop done a curriculum comparison for the Advanced Hospital Corps School and compared it to our on-campus Physician's Assistant Program.

This comparison measures structure and content by looking at the three components which make up a baccalaureate education. The components--Human Competence, Subject Competence and Vocational Competence, provide a structure in which we are able to measure each curriculum by course, content and objective.

The detailed comparison should be noted in the following pages. In summary we have arrived at the following conclusions:

Human Competence Requirement:

These are essentailly the same for both curricula, and are the responsibility of the student. This course work is to insure a measurable level of communication skills and social science information.

Subject Competence Requirement:

The entire subject competence area in Advanced Hospital Corps School (14 hours) can be applied toward subject competence within the physician's assistant program. Our analysis reveals that additional subject matter will be needed to firm up the students basic science knowledge foundation. (Specific course material in this area is contained in the detailed Curriculum Comparison which follows.)

Vocational Competence Requirement:

This competence area really provides the professional essence of both curricula. For comparison purposes this was subdivided into academic classroom instruction and clinical preceptorship experience.

Our analysis revealed that 23 hours of the Advanced Hospital Corps School curriculum could be directly applied to the physician's assistant curriculum in the academic classroom area and that 10 hours could be applied in the clinical preceptorship area.

Our final conclusions regarding this area is that the students will need a clinical medicine review linked with additional course materials in skills courses such as Physical Diagnosis and Electrocardiography. In addition we would recomment a fairly comprehensive set of clinical preceptorships to allow the student an opportunity to combine his old skills into practice with his newly acquired skills. (Specific course materials in this area are contained in the detailed Curriculum Comparison which follows.)

The George Washington Univeristy
School of Medicine and Health Sciences

Curriculum Comparison

ADVANCED HOSPITAL CORPS SCHOOL

Human Competence Requirement

English	6 hours
General Psychology	3 hours
Humanities & Social Studies	21 hours
	30 hours total

Subject Competence Requirement

HCS 010 Anatomy & Physiology	2 hours
HCS 016 Clin Lab Tech & Proced	3 hours
HCS 015 Pharm & Toxicology	5 hours
HCS 119 Intro to Patient Care	3 hours
HCS 116 Med Terminology	1 hour
	14 hours total

PHYSICIAN'S ASSISTANT PROGRAM

Human Competence Requirement

English	6 hours
Humanities & Social Studies	24 hours
	30 hours total

Subject Competence Requirement

HCS 110 Structure of Human Body	3 hours
BIOC 111 Biochem for NHP's	3 hours
PHYL 111 Physiology for NHP's	3 hours
HCS 116 Med Terminology	0 hours
PATH 152 Intro to Basic Lab Med	3 hours
HCS 109 Human Behavior I	2 hours
HCS 147 Intro to Radiology	1 hour
MICR 128 Microbiology for NHP's	2 hours
HCS 119 Into to Patient Care I	1 hour
HCS 113 Medicine and Society	1 hour
PATH 129 Pathology for NHP's	3 hours
PHAR 158 Pharmacology for NHP's	2 hours
	24 hours total

Requirements Lacking in Advanced Hospital Corps School

BIOC 111 Biochemistry for NHP's	3 hours
HCS 109 Human Behavior	2 hours
HCS 147 Intro to Radiology	1 hour
Micr 128 Microbiology for NHP's	2 hours
Path 129 Pathology for NHP's	3 hours

Comparable Course Requirements

AHCS(HCS 010 Anat & Phys=PAP HCS 110+PHYL 111)
AHCS(HCS 016 Clin Lab Tech & Proc=PAP Path 152
AHCS(HCS 015 Phar & Tox=PAP PHAR 158)
AHCS(HCS 119 Into to Pt Care Physical Diag
=PAP HSC 119)
AHEC(HCS 116 Med Term=PAP HCS 116)

The George Washington University
School of Medicine and Health Sciences

Curriculum Comparison

ADVANCED HOSPITAL CORPS SCHOOL

Vocational Competence Requirement

- Academic Classroom Instruction

HCS 092 Medical Material Mangmt	3 hours
HCS 093 Health Syst. Admin	3 hours
HCS 125 Manifest of Disease	17 hours
HCS 102 Food & Water San	4 hours
HCS 022 Into to Epidemiology	2 hours
HCS 067 Disaster Sanitation	2 hours
HCS 068 Environ Sanitation	2 hours
	33 hours total

Clinical Preceptorships

HCS 096 Clinical Experience	10 hours

Requirements Lacking in Advanced Hospital Corps School

HCS 134 Intro to Patient Care II	2 hours
HCS 137 Issues in Health Care	1 hour
HCS 140 Clinical Path Correlation	0 hours
HCS 146 Surg & Diag Proced	0 hours
HCS 148 Into to Electrocard	1 hour
HCS 150 History Taking Ref & Theo	0 hours
HCS 151 Clinical Pharmacology	2 hours
HCS 160 Medical Inpatient	5 hours
HCS 163 Medical Outpatient	5 hours
HCS 166 Surgical Outpatient	5 hours
HCS 169 Obstetrics & Gynecology	5 hours
HCS 172 Pediatric Outpatient	5 hours
HCS 178 Emergency Medicine	5 hours
HCS 198 Psychiatry	5 hours
HCS 199 Independent Study	5 hours

PHYSICIAN'S ASSISTANT PROGRAM

Vocational Competence Requirement

- Academic Classroom Instruction

HCS 125 Manifest of Disease	8 hours
HCS 135 Into to Patient Care II	2 hours
HCS 137 Issues in Health Care	1 hour
HCS 140 Clinical Path Corr	0 hours
HCS 146 Surg & Diag Proced	0 hours
HCS 148 Into to Electrocard	1 hour
HCS 150 History Taking Ref & Theo	0 hours
HCS 151 Clinical Pharmacology	2 hours
	14 hours total

Clinical Preceptorships

HCS 160 Medical Inpatient	5 hours
HCS 163 Medical Outpatient	5 hours
HCS 166 Surgical Outpatient	5 hours
HCS 169 Obstetrics & Gynecology	5 hours
HCS 172 Pediatric Outpatient	5 hours
HCS 175 Primary Care Precep	12 hours
HCS 178 Emergency Medicine	5 hours
HCS 198 Psychiatry	5 hours
HCS 199 Independenty Study	5 hours
	52 hours

Comparable Course Requirements

AHCS(HCS 125=PAP HCS 125 Manif of Disease)
AHCS(HCS 092 Med Mat Mgmt+HCS 095 Health Sys Admin=PAP HCS 113)
HCS 096 Clinical Experience does include aspects of HCS 160, HCS 166 & HCS 178, but is a general preceptorship of approx 11 weeks in length

Credit Summary

We feel that credit could be given for 47 of the 57 hours of Advanced Hospital Corps School toward construction of a physician's assistant curriculum of approximately 60 weeks in length and worth 43 hours of academic credit.

This would fulfill 90 hours of credit toward the degree, leaving the student the responsibility of obtaining 30 hours of human competence to meet the required 120 semester hours of academic credit for the Bachelor of Science in Health Science.

III. PROPOSED CURRICULUM

After completion of our curriculum comparison, we reviewed the data collected and have constructed a proposed curriculum for a joint U.S. Navy/George Washington University physician's assistant program.

This curriculum would be of 60 weeks in length composed of an academic core of 16 weeks in which time the students would cover 13 subjects to strengthen their basic and clinical science knowledge. The remaining 44 weeks would include two weeks for possible transfer time to a clinical site then 42 weeks of clinical preceptorships. This would consist of 6 preceptorships of six weeks in length each.

The proposed curriculum is outlined in detail as follows.

The George Washington University
School of Medicine and Health Sciences
United States Navy Physician's Assistant Program
Proposed Curriculum

Human Competence Requirement:

English	6 hours
Humanities/Social Studies	24 hours
TOTAL	30 hours

Human Competence Total: 30 Semester Hours

Subject Competence Requirement:

HCS Anatomy and Physiology	2 hours	Prerequisite course
HCS Clinical Lab Tech & Procedures	3 hours	work obtained in
HCS Pharmacology & Toxicology	5 hours	Advanced Hospital
HCS Intro to Patient Care(Phys.Diag)	3 hours	Corps School
HCS Medical Terminology	1 hour	(NEC-HM 8425)
TOTAL	14 hours	
HCS Anatomy & Physiology Review	0 hours	
HCS Chemistry of Health	2 hours	
HCS Microbiology	2 hours	
HCS Pathology	2 hours	
HCS Human Behavior(Psychology)	3 hours	
TOTAL	9 hours	

Subject Competence Total: 23 Semester Hours

Vocation Competence Requirement:

- Academic Classroom Instruction -

HCS Medical Material Mangement	3 hours	Prerequisite course
HCS Health Systems Administration	3 hours	work obtained in
HCS Manifestations of Disease	17 hours	Advanced Hospital
TOTAL	23 hours	Corps School
HCS Patient Care II(Adv.Phys.Diag)	3 hours	
HCS Issues in Health Care	1 hour	
HCS Clinical Pathological Correlation	0 hours	
HCS Surgical and Diagnostic Proced.	3 hours	
HCS Introduction to Radiology	1 hour	
HCS Intro to Electrocardiography	1 hour	
HCS Clinical Medical Review	2 hours	
HCS Clinical Pharmacology	3 hours	
TOTAL	14 hours	

Vocational Competence Requirement:

- Clinical Preceptorship Experience -		Prerequisite course work obtained in Advanced Hospital Corps School
HCS Clinical Experience	10 hours	
HCS Medical Inpatient		
HCS Medical Outpatient	3 hours	
HCS Surgical Inpatient	3 hours	
HCS Obstetrics/Gynecology	3 hours	
HCS Pediatric Outpatient	3 hours	
HCS Primary Care Preceptorship	3 hours	
HCS Psychiatry/Emergency Medicine	2 hours	
HCS Independent Study(Elective)	(3)hours	
TOTAL	20 hours	

Vocational Competence Total: 67 Semester Hours

Grand Total of Semester Hours to be
Eligible for the Degree: 120 Semester Hours

IV. PROPOSED IMPLEMENTATION PLAN

In planning and implementing a program such as we have outlined in this document, many things must be considered.

I bring up the following: student selection, location and staffing, and evaluation as basic considerations which are elementary to any educational undertaking, but I would like to underscore that these issues are only a few of the topics that need to be discussed when this proposal is discussed in a mutual meeting of all concerned parties.

A. Student Selection

The ultimate success of any educational process relies heavily on the caliber of students enrolled. I would suggest the following as absolute prerequisites for consideration of applicants for this educational experience.

1. Successful completion of Advanced Hospital Corps School (NEC-8425).

2. One year of Independent Duty after completion of Advanced Hospital Corps School.

3. The students must meet the undergraduate acceptance criteria of The George Washington University.

Certainly other criteria are important in consideration of potential applicants such as test scores, academic standing in past educational experiences, etc. But these additional kinds of criteria should be worked out by the board doing the selection.

B. Location and Staffing

We have raised these issues because we feel they are key

items in determining the academic quality of the proposed program.

This program would be considered off-campus in terms of cost and administrative record keeping, but should be linked closely with what is done educationally in our on-campus physician's assistant program.

Location. We would propose that the first 16 weeks of academic training be located at the National Naval Medical Center. This would give the students the opportunity for access to library resources at Bethesda as well as GWU., not to mention counseling, medical expertise, etc.

The remaining 42 weeks of clinical preceptorships could be located at three Naval hospitals such as San Diego, Portsmouth, and perhaps Bethesda, or Annapolis Navy hospitals. Two of these locations already house the Advanced Hospital Corps School and could with assistance pick up the responsibility for the clinical preceptorship experience. The other two locations, either of which could be used, already have expertise in PA training, therefore the students would not be unknown to the staff and faculty of these locations.

Staffing. When considering appropriate staffing patterns for a curriculum, many questions must be addressed. For example--What is the ideal student to instructor ratio? How many full-time faculty or part-time faculty are available? How many faculty are needed to handle the administrative coordination? These questions would not only apply locally but to the clinical preceptorship settings as well.

Evaluation. This educational undertaking must not only have standard student performance evaluation, it should also be evaluated as a pilot project itself.

By this we mean, what we are attempting to create is a new way of training physician's assistants, utilizing an old but successful method.

Essentially, we are taking a group of students who have had a standard measurable background, giving them credit for this experience and building upon it to reach a predetermined outcome.

This curricular model is basically the "MEDEX" model which utilized former military corpsmen, and trained them in a definable time period to become physician's assistants.

This model proved to be quite effective but does not work currently in the civilian sector because of the lack of military corpsmen leaving the armed forces.

Therefore, a set of well planned and designed evaluation tools must be developed to measure the effectiveness of our proposed project.

APPENDIX B

Provider Mix, Substitution Ratio and Total Cost Savings For Alternative Approaches

	Provider Mix MDs	Provider Mix PAs	MD/PA Substitution Ratio*	Total Savings	Savings Per PA
a. All-MD Staff	51.20	-	-	-	-
b. Least-Cost Combin. Assuming Triage of Consultative OVs to MDs where cost Effective	37.13	30.16	.47	$325,218	$10,783
c. Least-Cost Combin. Assuming Triage of All Category C OVs to PAs	37.11	34.46	.41	$277,000	$ 8,038
d. Least-Cost Combin. With Supportive Services Deflated	32.62	30.10	.47	$324,475	$10,780
e. Least-Cost Combin. With a 40-Hour Week (1920-Hour Year) for PAs	36.75	25.29	.57	$399,004	$15,777
f. Least-Cost Combin. With a 52-Hour Week (2477-Hour Year) for PAs	36.30	19.60	.76	$485,502	$24,771
g. Legally Constrained Mix With a 1:1 MD-PA Supervisory Ratio	44.08	17.99	.40	$133,381	$ 7,414
h. Legally Constrained Mix With a 1:2 MD-PA Supervisory Ratio					
1. 2x7.83% of an MD's time	39.69	25.67	.45	$254,676	$ 9,921
2. 1.5x7.83% of an MD's time	39.19	25.67	.47	$278,521	$10,850
i. Mix Constrained by Physician Preference	38.60	26.99	.47	$291,457	$10,799

This appendix shows the cost effectiveness of the various mixes of PAs and doctors. OV stands for office visit, which was the measuring device used for health care delivery. The costs listed are based on the hourly wage for PAs of $12.15 and of $21.63 for physicians.

* For each approach, the number of MDs in the resulting mix is subtracted from the number of MDs who would be required for an all-MD staff; that figure is divided by the number of PAs in the mix. Rounding sometimes conceals small differences. Note that except in Approaches e and f, the substitution ratio is depressed by the very large difference in the PA and MD work years--1610 vs. 2477 hours. In Approach e, a hypothetical 1920-hour year (40-hour week) is used for PAs, and in Approach f the two work years are hypothetically equated. The results are sharp rises in the substitution ratio.

SOURCE: Kaiser Foundation Hospitals, Health Services Research Center Report, Cost Effectiveness of Physician's Assistants, by J. C. Record, 28 April 1976.

APPENDIX C

Comparison of Total Cost Savings Utilizing Physicians Assistants: Phase I Model Versus the Phase II Maximum-Substitution Model

	Phase I Calculus	Phase II Model	Difference
Number of MDs	32.6	29.0	3.6
Number of PAs	34.5	29.3	5.2
All-MD Costs	$2,271,587	$2,042,932	$228,655
Costs of MD-PA Combination	$1,947,112	$1,715,945	$231,167
Savings:			
Total Amount	$ 324,475	$ 326,987	$ 2,512
As % of All-MD Costs	14%	16%	2%
Per PA	$ 9,405	$ 11,160	$ 1,755

SOURCE: Kaiser Foundation Hospitals, Health Services Research Center Final Report on Phase II, Cost Effectiveness of Physician's Assistants in a Maximum-Substitution Model, J. C. Record et. al., 1976

APPENDIX D

1975-1985 Health Manpower Needs in an Efficient System of Office-Based Primary Care: Current Practice+

	Manpower Supply			Optimal Manpower Requirements (Demand)			Manpower Need*		
Year	MDs	NPs	PAs	MDs	NPs	PAs	MDs	NPs	PAs
1975	4442	100	N/A	4294	1158	N/A	+148	-1058	N/A
1980***	5165	192	N/A	5453	1471	N/A	-288	-1279	N/A
1985***	5969	319	N/A	6925	1868	N/A	-956	-1557	N/A

1975-1985 Health Manpower Needs in an Efficient System of Office-Based Primary Care: Hypothetical Situation

	Manpower Supply			Optimal Manpower Requirements (Demand)			Estimated Manpower Need*		
Year	MDs	NPs	PAs	MDs	NPs	PAs	MDs	NPs	PAs
1975	4442	100	N/A	2557	563	471	+1885	-463	-471
1978**	4901	141	61	2941	647	542	+1960	-506	-481
1980***	5165	192	109	3247	715	598	+1918	-523	-489
1985***	5969	319	230	4124	908	759	+1845	-589	-529

*Supply - Demand = Need
+ Need = Manpower Surplus
- Need = Manpower Deficit

** The 1978 projections reflect manpower requirements after a 15% increase in primary care service demand has occurred since 1975.

*** The demand projections developed by the Office of Health Manpower indicate a 27% increase in primary care demand per 5 year period.

+ Optimal demand estimates based on current usage of health manpower.

SOURCE: New Jersey Department of Higher Education Report, Study of Potential Need for Nurse Practitioners and Physician's Assistants in New Jersey, January 1977.

APPENDIX E

The Rand Corporation Model To Select The Least-Cost Team Of Practitioners To Meet Patient Visit Demands

The Model

An activity s_{td} is defined as a practitioner team t caring for a patient with diagnosis d. Each unit of this activity produces one patient visit. x_{td} = 0, 1, 2, ..., n depending on number of patient visits with diagnosis d that team t produces.

The outpatient clinic must meet a set of patient visit demands:

$$\sum_{t=1}^{T} x_{t1} = S_1$$

$$\circ$$
$$\circ$$
$$\circ$$

$$\sum_{t=1}^{T} x_{tD} = S_D$$

where: S_D = total patient visits seen by all practioner teams with diagnosis D, and there are a total of D diagnoses.

With each activity is a set of real manpower costs a_{td}:

$$a_{td} = \begin{bmatrix} a_{td1} \\ \circ \\ \circ \\ \circ \\ a_{rdR} \end{bmatrix}$$

R = total number of manpower resources (MDs, PAs, NUs, CPs)

SOURCE: Rand Corporation Report WN-9247-PR, pps. 4-8, 23 September 1975.

One element of a_{td} might be minutes of physician (MD) time, another element minutes of physician assistant (PA) time, etc.

Manpower resources can be purchased in variable amounts at prices Pk. The cost of an activity (C_{td}), therefore, is the product of vector, p, and the resource vector a_{td}:

$$p = \left[p_1, \; . \; . \; . \; . \; . \; p_R \right] \qquad\qquad a_{td1}$$

$$_{d} = p \quad a_{td} = \left[p_1, \; . \; . \; . \; . \; p_R \right]$$

The problem is to minimize the variable cost of meeting a given set of service demands:

$$\text{minimize} \quad \sum_{t=1}^{T} \sum_{d=1}^{D} C_{td} \, X_{td}$$

$$\text{such that:} \quad \sum_{t=1}^{T} x_{td} = S_d \quad \text{for } d=1, \; . \; . \; . \; , \; D.$$

Resource restrictions not reflected in the price system, such as a shortage of PAs, impose the constraint:

$$\sum_{t=1}^{T} \sum_{d=1}^{D} a_{tdi} x_{td} \leq \overline{Y}_i$$

where: $\overline{Y}_i$ is the limit on the amount of the i^{th} resource currently available.

Assume, for this project that, there is no limit on the amount of resources available. This means that the model can

be solved by means other than linear programming (which is what Rand did).

The solution to this model represents an ideal solution in which the diagnosis of the patient is known when he arrives. This solution is called the "perfect triage" solution. Return visit patients and patients seeking physicals can be perfectly triaged. However, first-visit patients cannot. This means that they must be randomly assigned to the practioner teams in the outpatient clinic. If each team is required to see its "fair share" of first-visit patients in each diagnostic group, the additional constraint is imposed:

$$\frac{x_{td}}{s_d} = \frac{\sum_{d=1}^{D} x_{td}}{\sum_{d=1}^{D} s_d}$$

for all t, and for all d that represent first-visit diagnoses. This equals:

$$x_{td} \sum_{d=1}^{D} s_d - s_d \sum_{d=1}^{D} x_{td} = 0$$

The solution that employes this constraint is called the "random assignment solution".

APPENDIX F

Rand Study's Optimum
Manpower Staffing Under Alternative Organizations
for the General Medical Clinics

	Random Assignment For First Visit		Perfect Triage For First Visit		Actual Manpower Use At Robins (June 1974)
	Solution 1 All Teams Possible	Solution 2 Nurse + Corp. & Corp Deleted*	Solution 3 All Teams Possible	Solution 4 Nurse + Corp, & Corp Deleted*	
No. of MDs	2.7	2.7	2.2	2.2	4.7
No. of PAs	0	4.4	.3	3.3	1.9
No. of Nurses	1.9	.8	1.4	.8	.5
No. of Corpsmen	3.8	1.2	4.1	1.8	3.4
Salary Cost 1 Year	$222,000	$230,000	$192,000	$199,000	$330,000

* Nurse & Corpsman, Corpsman only teams deleted from first visit cases only.

SOURCE: Rand Corporation Report WN-9247-PR, The Organization of Outpatient Care: An Interim Report, With Special Reference to Robins Air Force Base, 23 September 1975

APPENDIX G

Air Force Cost Analysis For The Physician Assistant Course
Cost Per Student Estimated For FY 79

Phase I Cost Estimate Factors (FY 79)	28 Students Air Force	28 Students Army	56 Students Air Force	56 Students Army
Student Salaries	$11,986	$14,360	$11,986	$14,360
Staff Salaries	$ 4,830	$ 4,830	$ 3,000	$ 3,000
Transportation Costs	$ 1,382	$ 1,651	$ 1,382	$ 1,651
Equipment & Supplies	$ 300	$ 300	$ 300	$ 300
Univ. of Oklahoma Affiliation	$ 300	$ 300*	$ 300	$ 300*
Overhead (Indirect)	$14,803	$14,803	$14,803	$14,803
TOTAL	$33,601	$36,244	$31,771	$34,414

Phase II Cost Estimate Factors (FY 79)	28 Students Air Force	28 Students Army	56 Students Air Force	56 Students Army
Student Salaries	$11,986	$14,360	$11,986	$14,360
Transportation Costs	$ 1,382	$ 1,180	$ 1,382	$ 1,180
Training Evaluation Costs	$ 1,633	Unknown	$ 1,633	Unknown
Staff Assistance Visits	$ 78	Unknown	$ 38	Unknown
Univ. of Oklahoma Affiliation	$ 300	$ 300*	$ 300	$ 300*
Overhead (Indirect)	$ 1,645	$ 1,645	$ 1,645	$ 1,645
TOTAL	$17,024	$17,485	$16,984	$17,485

* To be paid by the Army for those students accepted into the University of Oklahoma Degree Program.

SOURCE: Unofficial Cost Estimate prepared by the School of Health Care Sciences, Sheppard Air Force Base, 1978.

APPENDIX H

The Rand Study's
Minimum Cost Alternative for First Visits

Random Assignment for First Visits

Diagnostic Category	Team Selected: All Teams Possible	Team Selected: NU + CP, CP only Deleted for First Visits
All First Visits*	NU + CP	PA
Return Visits-MD Needed	MD + CP	MD + CP
Return Visits-MD Not Needed	NU	NU
Physical Exams		
Well-Adult	MD + CP	MD + CP
Flight Physical	MD + CP	MD + CP
Other	CP	CP

Perfect Triage for First Visits

Diagnostic Category	MD Referral?	Team Selected: All Teams Possible	Team Selected: NU + CP, CP Only Deleted
Any Hard	Yes	MD + CP	MD + CP
Any Hard	No	MD + CP	PA
Int - Int - Int	Yes	MD + CP	MD + CP
Int - Int - Int	No	CP	PA + CP
Easy - Int - Int	Yes	MD	MD
Easy - Int - Int	No	CP	PA
Easy - Easy - Easy	Yes	MD + PA	MD + PA
Easy - Easy - Easy	No	NU + CP	PA

Key: MD = Physician NU = Nurse
PA = Physician Assistant CP = Corpsman

*With referral to MD as necessary

SOURCE: Rand Corporation Report WN-9247-PR, The Organization of Outpatient Care: An Interim Report, With Special Reference to Robins Air Force Base, 23 September 1975.

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